

The Mining Journal

Established 1835

Railway & Commercial Gazette

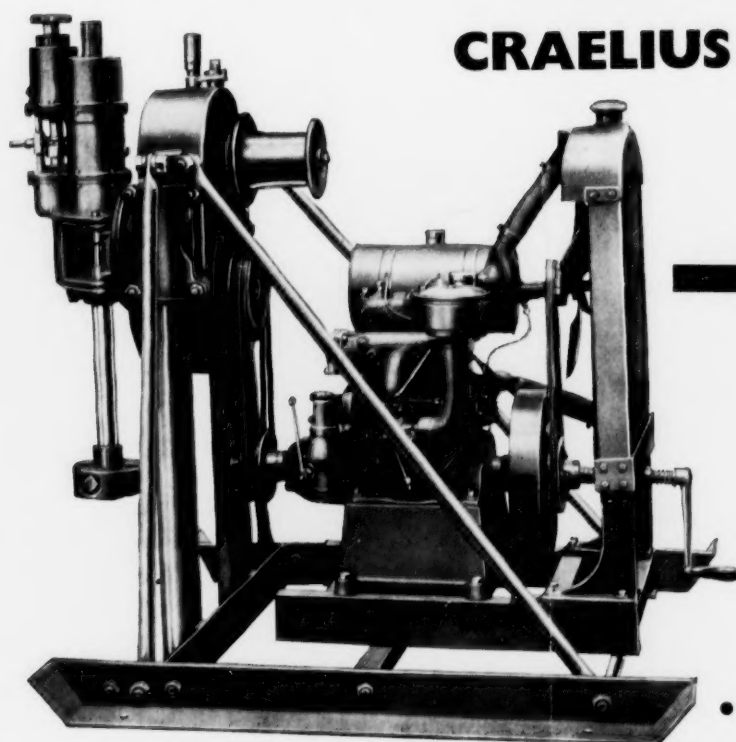
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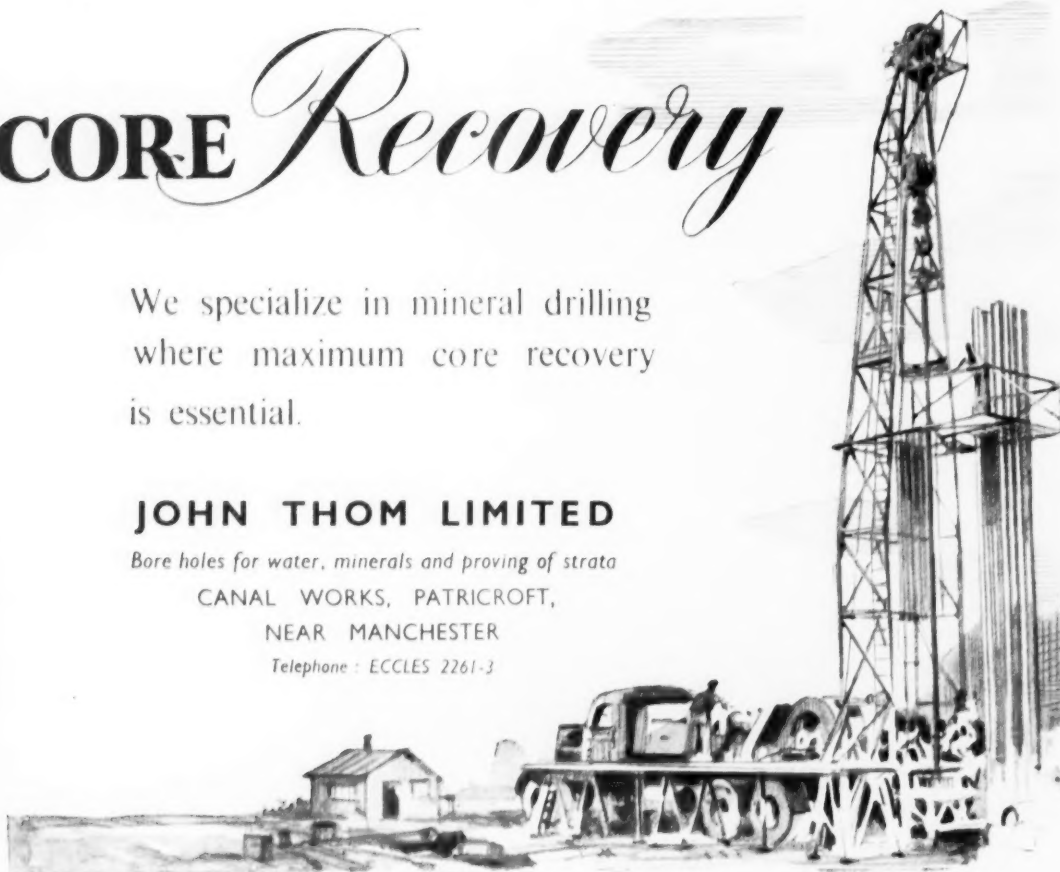
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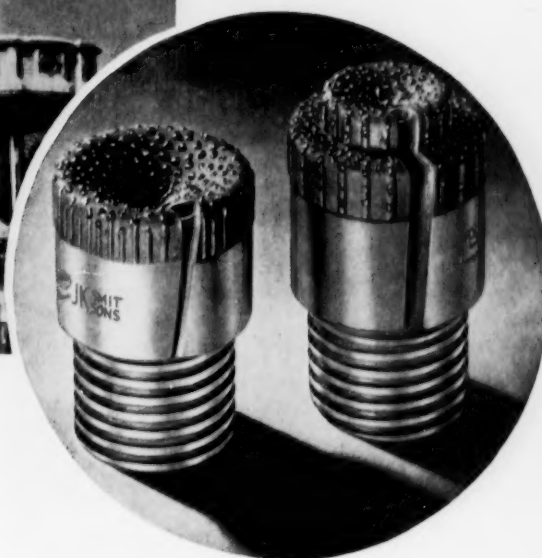
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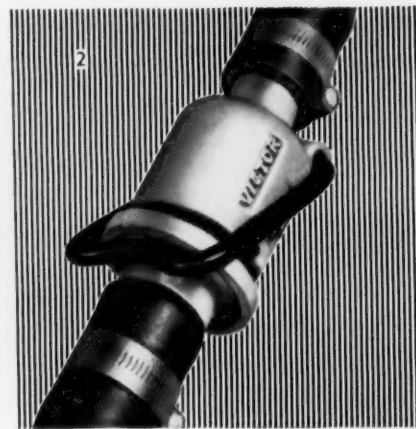
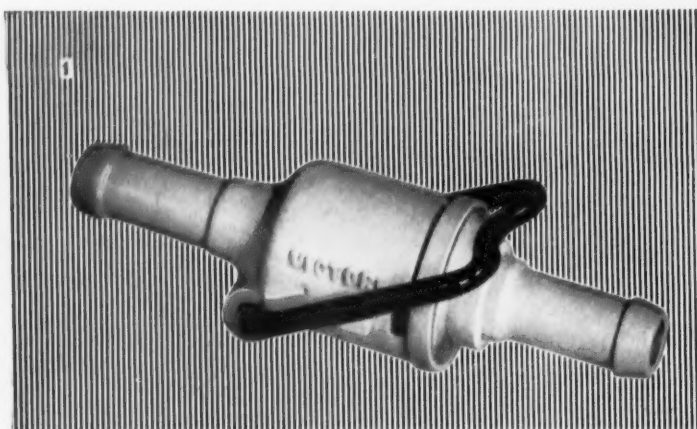
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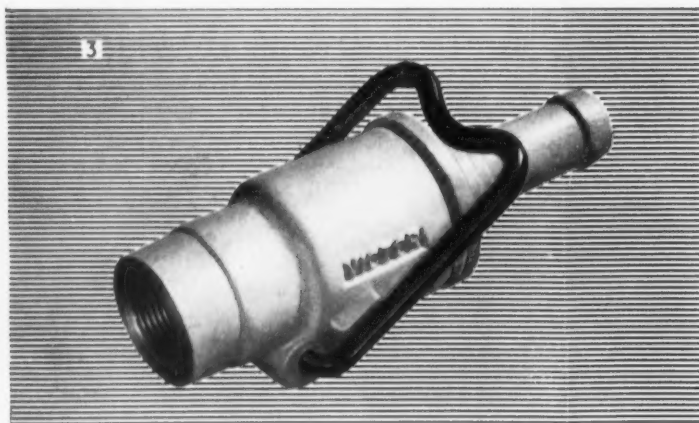


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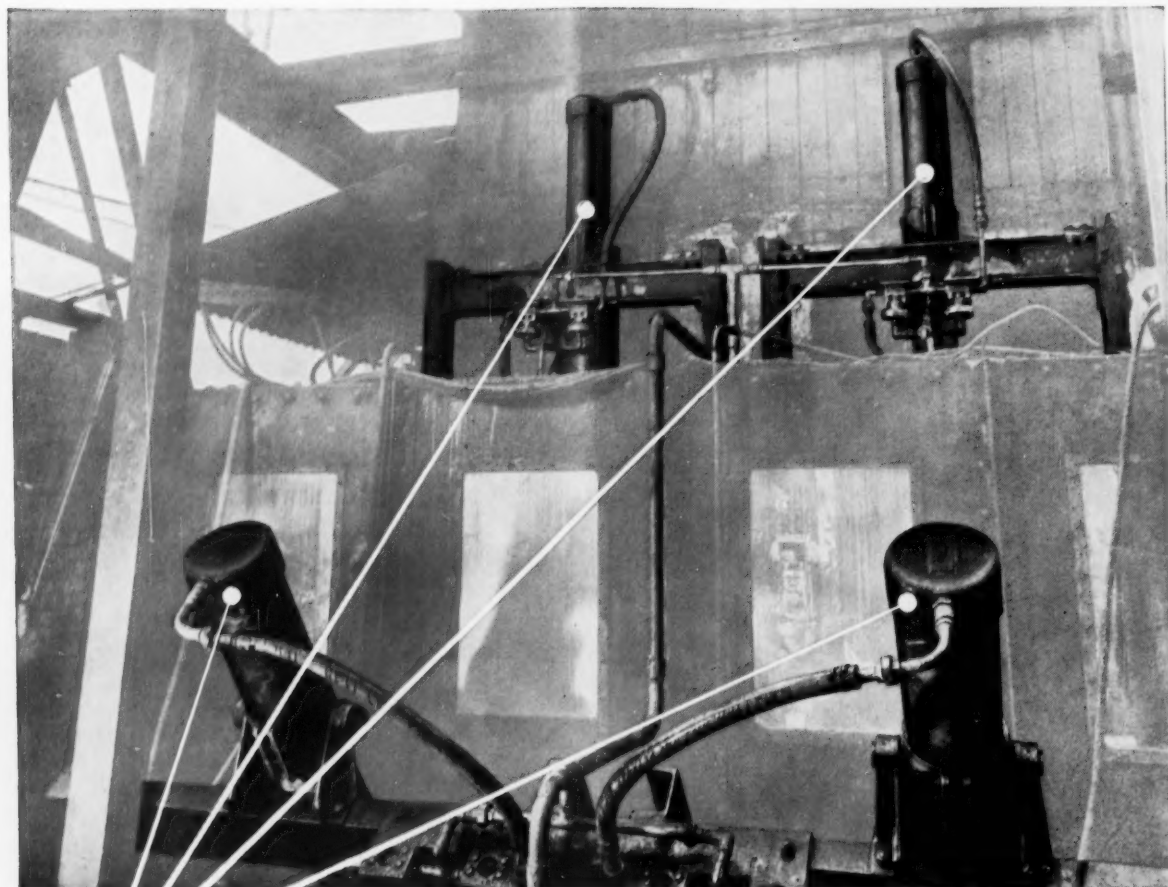
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NOTES AND COMMENTS

The Economic Survey, 1955

The Economic Survey for 1955, summarized on page 360 for the benefit of our newspaperless readers, was presented by the Chancellor of the Exchequer to Parliament on Tuesday and published as a White Paper.

It is an optimistic document. Whether it is too much so remains to be seen, although it is hard to resist the feeling that much of what Mr. Butler hopes to achieve will depend, not only on a concerted effort from every section of industry, but also on a fair share of luck. But may this not be the most practical way to assess future prospects now that the shaping of this country's economic destiny depends so much on what happens elsewhere?

Indeed, our aims are to a considerable extent determined by what happens in the United States and Mr. Butler acknowledges this fact in full. The background for the Survey is the rising curve of production in the United States, and the confidence engendered by that encouraging situation has set the tone for the White Paper.

The essential point emerging is that this country must increase its exports. The Survey believes that the immediate outlook for world trade is reasonably favourable. The United Kingdom cannot, of course, rely on an expansion of her export trade this year with Australasia but now that production is rising in the United States, opportunities, it concludes, are more favourable for increasing exports to North America and, also to Persia and Egypt where recent agreements have improved trading prospects. Be that as it may, the generally freer international trading climate prevailing also means that British exports have to be highly competitive if overseas sales are to be expanded in the face of the bigger export drives conducted by Germany and Japan.

Thus the main objective of the U.K.'s economic policy will be to ensure that adequate incentives are provided for long run expansion. At the same time, this must not result in the level of purchasing power being so high as to interfere with the growth of exports or to attract a larger volume of imports than the nation can afford. To effect these goals, the Survey states that what is needed is the kind of economic climate which is stimulating to industrial development and research and encourages a dynamic and go-ahead attitude in industry.

To this end plans have been put forward for developing

supplies of fuel and power, steel and transport to meet the demands of an expanding economy. The massive investment programme which this involves, supported as it will be by the Government will be a contribution of real significance to the maintenance of full employment.

But a sustained expansion, the Survey declares, can only be achieved if costs and prices are kept stable. This requires that competitive prices be charged in industry and commerce and that increased efficiency be reflected wherever possible in price reductions.

All this is, of course, good sound common sense, but as the Survey points out a great deal will depend on the rate at which foreign markets are expanding and on the rate at which supplies of the commodities imported are being developed. For this reason a world economy is needed in which trade and production expand steadily and in which trade can flow freely. This demands close and continuing international co-operation.

What the Survey sets out to do is to create a healthy attitude towards the future and to create a favourable economic climate by reducing uncertainties to rational possibilities. If the optimistic form in which the Survey is cast tends to outrun reality in places, there is everything to be said for the concept that general confidence in the possibilities of expansion will do much to ensure that expansion is, in fact, achieved.

In any event, Mr. Butler has it in his power to drive home the points made in the Survey to their logical conclusion when he presents his budget on April 19.

Development of Moroccan Mineral Resources

A report of the Bureau de Recherches et Participations Minières (BRPM), published recently, states that the French Protectorate administration in Morocco will invest a total of £1,600,000 in mineral prospecting projects during the current four-year plan (1954-1957). In addition, the administration will make available loans totalling £800,000 to private mining enterprises for prospecting and re-equipment. The loans will be made within the framework of an industrial support programme at present being studied in Paris. This programme will be part of a scheme designed to boost the country's economy and will also include temporary subsidies. These activities follow the French Government's policy of investing large sums

for the development of French possessions in Africa, which were discussed in our issue of February 11, 1955.

In the first four-year plan ending in 1953 the BRPM spent a total of £999,000 on its own prospecting projects and on aid to private enterprises in Morocco. Of this sum, £477,000 went to prospecting as against capital totalling £970,000 invested by private enterprise during the four-year period, and £522,000 was invested in private mining companies as against £1,988,000 contributed by private capital. Thus a total of £3,956,000 was invested in mining generally in the period 1950-53, not counting the Cherifian Phosphates Office which is an autonomous State monopoly.

Within the framework of the second four-year plan, the BRPM will make investments in two ways. Firstly, the BRPM's prospecting programme will entail, either directly or in participation with private enterprise, the expenditure of £400,000 a year. Of these funds, £100,000 will be spent a year on direct prospecting for copper by the BRPM itself; while other mineral deposits, mainly zinc, lead, tungsten, molybdenum and potassium, will be prospected at the rate of £200,000 a year directly and £100,000 through private prospecting companies or individuals. Secondly, the BRPM will make available in the form of loans to private enterprise a sum of approximately £200,000 a year for the purpose of prospecting and re-equipment as part of the industrial support programme.

The Moroccan phosphates industry, the report states, succeeded in producing the 4,000,000 tons per annum which the first four-year plan had set as its target. As for the possibility of increasing mineral output during the current four-year plan, the report states that manganese production is likely to remain between 400,000 and 450,000 tons a year as at present. Only four Moroccan manganese mines will remain economic at producers in the event of a fall in world market prices, and even these will be more or less marginal because of high transportation costs.

The outlook for lead and zinc is better and production is likely to be increased in the current four-year plan.

Radioactive Minerals in Pakistan

It is reported that there exist bright prospects of discovering large deposits of radioactive minerals in West Pakistan. Indeed, the Pakistan Government has already announced its intention to utilize atomic energy in the improvement and development of industry.

The government is sending a team of observers to areas said to be rich in radioactive minerals. These areas include Chitral, Dir, Gilgit, part of the North-West Frontier Province and Azad Kashmir adjoining Chinese Turkestan. A seismic survey of these areas will be made.

S.A. Mines Exempt from Profits Tax

Following the presentation of the South African budget, reported here last week, the South African Finance Minister, Mr. Eric Louw, made it clear in an interview that the undistributed profits tax would not apply to mining companies. He said that there was some doubt whether the application of the tax to mining companies would be warranted because a distinction had always been made between mining companies on the one hand and industrial and commercial companies on the other in regard to the rate of taxation for deduction of capital expenditure.

Mr. Louw added that, in these circumstances, it had been decided to exclude these companies from the incidence of the tax in 1955 and to investigate the whole matter during the next recess of Parliament.

Ceylon and India

(From Our Own Correspondent)

Colombo, March 22.

The recent inauguration of the Burmah-Shell oil refinery in Bombay marked a milestone in India's industrial progress, adding another 2,000,000 tons of crude oil a year to the country's refining capacity. The refinery is the product of the large-scale investment of foreign capital in India.

Built at a cost of approximately Rs.300,000,000, the refinery went into initial production on January 30 this year, twelve months ahead of schedule, and the first consignment of "home made" gasoline was shipped to Calcutta a fortnight later. Of the three producing Indian refineries, the Burmah-Shell Refinery is the largest, with a potential total output of 475,000,000 gal. a year of kerosene, motor spirit, diesel and furnace oils. In addition, it will be the sole producer of bitumen in India. By 1957, when all the three new refineries will be in production, they are expected to meet at least 80 per cent of India's requirements of petroleum products.

According to the refinery agreement of 1951, crude petroleum, the principal raw material for the refineries, will be imported mostly from the Persian Gulf area and will be carried in tankers of up to 30,000 tons capacity. These tankers will use the new marine oil terminal which is being built at Butcher Island, off Bombay. Seven submarine pipelines have also been laid to link the new marine terminal with the refineries.

The oil industry is now distributing more petroleum products than ever before. Nearly 3,000,000 gal. of oil per day are being delivered throughout the country. This represented an annual rate of consumption 50 per cent above that for 1948. The total cost of the three new oil refineries will be over £46,000,000, most of this sum representing capital provided by the oil companies.

PETROLEUM IN ASSAM

The existence of petroleum had recently been discovered by the Assam Oil Company in Naharkatiya area in Assam, according to a statement made by Mr. N. Kanungo, Deputy Commerce Minister, Government of India. The extent and importance of the discovery has not been established. The minister added that the Geological Survey of India had carried out preliminary geophysical explorations in Eastern Saurashtra and parts of Gujarat and detailed geological mapping in the Jawalamukhi area in East Punjab for possible oil-bearing structures. Gravity and magnetic surveys in the coast sedimentary tract of Madras State were started in the field season 1954-55.

The Government of India had entered into an agreement with the Standard Vacuum Oil Company of America for joint exploration for, and production of, petroleum if discovered in commercial quantities in West Bengal.

The Board of Directors of the Burmah Oil Company, which is jointly owned by the Burmese Government and British oil interests in Burma, have decided to build a new oil refinery in Syria, near Rangoon, in place of the old one destroyed during the war. The pipeline, which before the war brought down crude oil to Rangoon from the Chauk oilfields in Central Burma, a distance of 300 miles, will not be used for the time being.

The production capacity of the new refinery is estimated at 3,000 bbl. per day and it would not make it worthwhile for the pipeline to be used. It is stated that the new Syrian refinery and the one set up at Chauk this year will be large enough to make Burma self-sufficient in all the main petroleum products.

Phosphate Mining Operations in South Africa

The fertilizer industry in South Africa has hitherto been dependent upon importation for the bulk of its requirements of rock phosphate for superphosphate manufacture, but the establishment of a large apatite mine in the Phalaborwa area indicates that self-sufficiency in phosphate supply is in sight. The new mine is owned by a public utility corporation named the Phosphate Development Corporation (FOSKOR) and the following article describes the nature of the Phalaborwa ore and the methods of treatment employed for economic recovery.

The Phalaborwa area comprises a pyroxenite mass some six or seven miles in extent, which is surrounded by granite and syenite. Apatite is exceedingly widespread in the pyroxenite as well as in crystalline limestone and associated rocks. It is commonly associated with vermiculite and with felspar veins or stringers of felspar crystals, but even where these minerals do not occur, the pyroxenite usually has a phosphate content. Composite samples of ore from dumps of old and new workings in this portion of the field varied from 10.6 to 19.3 per cent P_2O_5 , while selected individual specimens ranging from 16 to 38 per cent P_2O_5 .

Until a few years ago, it was believed that the occurrence of apatite in considerable quantity was confined to the pyroxenite. This area was worked in the early 30's by the South African Phosphate Co. and though a high-grade product was obtained, the company was compelled to close down after a few years. One of the main reasons for the closure was the inability to meet the competition of imported rock phosphates, which then were shipped at low prices to the superphosphate factories already established on the coast.

THE GOVERNMENT INTERVENES

The outlook for Phalaborwa phosphates has since been profoundly altered by the late Dr. Hars Merensky, who was able to show that a body of limestone, magnetite, apatite, and serpentine, known as the Loolekop orebody, contained apatite ore of substantially higher grade than the average surrounding pyroxenite, and that this mineral was persistent and well-defined. Laboratory and pilot plant tests have established that the ore can be concentrated by means of modern flotation reagents and plant.

Early in 1951, the South African Government decided to acquire the phosphate-bearing claims of the Transvaal Ore Co. (Dr. Merensky) and the Loolekop Phosphate and Vermiculite Co. Its intention was to undertake the production of crude phosphate on a national basis. The Phosphate Development Corporation (FOSKOR) took over exploration and development work in August, 1952. In August last year the foundation stone of the new phosphate mine was laid by the Minister of Economic Affairs, Mr. Eric H. Louw. It was hoped to have the initial plant in commission by the end of 1954, while plans for quadrupling the scale of production are already under close consideration. The requirements of the local market exceed 400,000 tons of apatite per year. The combined reserves of the Loolekop and pyroxenite deposits are reported to be capable of meeting the whole of this demand for the next hundred years. For many years mining will consist of open pit working, using large tonnage blasting and mechanical shovels. A 4 ft. x 5 ft. primary jaw crusher will provide for large material and so eliminate secondary blasting to the fullest possible extent.

The first systematic concentration of Loolekop apatite ore in a test laboratory was made in 1947 by the American Cyanamid Company in Stamford, Conn., U.S.A. The ore had an apatite content of 25 per cent, and after grinding to 35 per cent mesh was successfully froth-floated in the laboratory to a grade of 37 per cent P_2O_5 with a recovery of 70 per cent. Grades of 33 to 34 per cent P_2O_5 gave recoveries of

85 per cent. Overgrinding was found to be detrimental to the production of a clean phosphate.

THE FLOWSHEET

The flowsheet is based on extensive laboratory tests and plant operations carried out in 1952 on a 90 ton sample of Loolekop ore at the Colorado School of Mines Research Foundation, and on behalf of FOSKOR at the Government Metallurgical Laboratory in Johannesburg. The apatite content of 25 per cent indicated by the tests at Stamford has been confirmed by a weighted average of 901 prospecting samples taken over a total sampled distance of 1½ miles. A reasonably constant value, can, therefore, be anticipated in the crusher ore. It is considered, however, that the proportions of magnetite and calcite will vary considerably from their respective averages of 30 per cent and 23 per cent.

Since the magnetite will be removed in wet magnetic separators before flotation, variations in its proportion will affect the actual phosphate grade of the material sent for flotation. These variations, however, are likely to be progressively "flattened out" as a result of bin storage, milling and thickening. The same consideration applies to the limestone and vermiculite constituents, but the fact that these materials go to flotation along with the apatite and tend to float with it, renders their rejection a matter of close control of flotation reagent properties.

Laboratory tests have shown that the reagents "Quebracho" and "Marasperse CB" both depress most of the calcite and vermiculite, together with the apatite. On the other hand, the apatite can be floated to the practical exclusion of other minerals by closely regulating to a minimum the addition of oleic acid or "Emersol 300" as the collecting agent, but recovery is then severely affected.

HIGH RECOVERY

The flowsheet therefore envisages a combination of low collector quantity and optimum depressant quantity, adjusted to give high recovery. It is also designed to minimize overgrinding, which accelerates the flotation of lime and vermiculite. Provision is made for a secondary stage of conditioning for flotation of reground coarse tailings.

It will be seen that the flowsheet allows alkalis to be added either in the primary mill or in the first conditioner, while conditioning can still be effected at high or low pulp density with the reagents adjusted to give maximum grade of concentrate in primary flotation. The loss of apatite in primary flotation, due to coarse size and/or low collection additions, is largely recovered in a second flotation circuit using reconditioned and deslimed rougher flotation tailing as feed.

The plant was designed by the German firm of Gutehoffnungshuette A.G. and is being constructed partly in Europe and partly in South Africa.

It is considered that large scale bulk mining, followed by mechanical concentration, will enable the product to be delivered to existing superphosphate factories on the coast at a cost comparable with that of imported rock phosphate. The development of a dependable local source of apatite might well lead to the erection of a third superphosphate factory, more favourably situated in regard to the northern areas of the Union.

COLUMBITE—III

Columbite Dressing Practice

By F. B. MICHELL, B.Sc., A.C.S.M., M.I.M.M.

Columbite is derived mainly from Nigeria, where it occurs both in alluvials and in certain primary granites as a minor constituent. The following article, the third of a series, describes the methods used in columbite dressing, and concludes by discussing possible developments in treating primary columbite. Some aspects of columbite production in other parts of the world will be dealt with in a subsequent issue.

Columbite almost always occurs in a fairly fine state of division and as it possesses a fairly high sp. gr. (about 5.3), it is concentrated along with the cassiterite and other "heavy" minerals. Preliminary alluvial concentration in most areas is carried out in sluice boxes although jigs have been employed to a limited extent, mainly in dredging operations.

ALLUVIAL CONCENTRATION

The wash is removed in three main ways, by hydraulic and gravel pumps, by dragline to stockpile where it is disintegrated by a monitor and delivered to the boxes by gravel pump, or by hand-digging followed by concentration in boxes or in ground sluices. Before delivery to the boxes, grizzlies are sometimes used to eliminate stones and clay balls whilst boxes vary in width, length and number depending on the fineness of the wash and the volume of ground handled. (White states that 10 cu. yd. per box or 60 sq. ft. per cu. yd. per hour should be used for fine columbite but the box area is usually considerably less, being from 20-40 sq. ft. per cu. yd. per hour depending on the fineness of the valuable components in the ground.)

The sluice boxes are set on a grade which is about seven per cent and usually should not be less than six per cent when using a gravel pump at a 10/1 dilution. A heavy feed, that is one containing much sand with neither clay nor oversize, requires a steeper slope than when either is present. A flat box will also lose value if the slope is such that the bed becomes inactive and the riffles ineffective.

The value of the ground fed to boxes varies considerably. In gravel pump properties all the ground is treated although "wash" is handled more slowly than overburden (and the wash is somewhat diluted by overburden). In dragline operations, the wash is richer and, being removed separately, necessitates more careful sluicing.

At each riffle there must be a drop to create a boil and disturb the bed, the riffles being about 8 ft. apart with a fall of 5 to 6 in. between each riffle (higher at feed end). The boxes are cleaned up at intervals making a concentrate which varies from 10 to 35 per cent Sn. The concentrate is taken from the boxes to central dressing plants where the tin is cleaned and the columbite separated. In these operations standard plant is used involving wet gravity concentration, pneumatic tabling, magnetic separation and electrostatic separation.

SCOPE OF BATCH TREATMENT

Batch treatment is general and at one large dressing plant the operations consist of first classifying and concentrating into two products, the underflow being redressed in ground sluices making a rich concentrate and a tailing for further treatment whilst the overflow is treated in a jig followed by tabling. The fine concentrate as well as the tailing from the coarse fraction is dried, sized and submitted to further treatment involving pneumatic table concentration, magnetic separation and electrostatic separation for the renewal of monazite and zircon. Certain tailing products are cleaned on tables and the concentrate retreated by dry methods.

At another property the box concentrate is screened on site and first cleaned in a long sluice before removal to the dressing plant, where further concentration is carried out in Willoughby concentrators and on James tables. These gravity concentrates are then treated by magnetic, pneumatic and electrostatic separation. At other properties the concentrate is first dried and screened into fractions from 20 to 60 mesh, the coarse fractions being treated in a magnetic separator whilst the -60 mesh fraction is first cleaned on a table. In the magnetic separation, ilmenite is first removed as a reject, then a mixed product taken off for further treatment; with a strong field a columbite product is made and lastly a monazite-columbite product contaminated with tin and some zircon (sometimes slightly magnetic) as well as the non-magnetic fraction (largely cassiterite and zircon).

Mixed material containing columbite, magnetic cassiterite as well as any monazite and zircon can be cleaned by pneumatic table. Electrostatic separation is reserved for the removal of monazite and zircon, both being non-conductors, from tin and columbite products.

MAGNETIC SEPARATION

Various types of magnetic separators are used—the Rapid and the H. and H. Wetherill type are both popular, and the rapidity is also considered to be very efficient. For scavenging pneumatic table tailing of the last traces of columbite, the induced roll type of separators are now being used and appear ideal for this duty.

As far as electrostatic separators are concerned, the Kipp-Kelly machine is most generally used although one or two Sturtevant units are in use. The Carpc type popular in Florida on beach sands and used in Malaya in tin sheds does not appear to have been tested. Pneumatic tables are almost exclusively the Kipp-Kelly type. It will be seen that although the roughing concentration is simple and indeed crude, the final cleaning of columbite is more complicated and requires repeated treatment.

When no magnetic cassiterite is present, magnetic separation tends to produce a fairly clean ilmenite followed by a columbite cut. Should some columbite be removed with the ilmenite, it has sufficient density to be largely removed by gravity using either ordinary tables or pneumatic tables. Similarly, if monazite contaminates the columbite, electrostatic separation can be used with advantage. The tin remains in the non-magnetic fraction and can be cleaned from associated zircon by means of pneumatic tables or electrostatic methods.

When magnetic cassiterite occurs, however, it gives more trouble, as the magnetic properties are very variable, some cassiterite being almost as magnetic as ilmenite and consequently contaminating the columbite. Electrostatic separation is useless as both minerals are good conductors, but owing to the specific gravity differential, these minerals can be separated on a pneumatic table provided the feed is closely sized. It is true that the magnetic properties of cassiterite can be destroyed by heating, but a high temperature is necessary and to date it has not been adopted in Nigeria so far as is known by the writer, although metallurgical works buying columbite concentrate in this country have employed the procedure for some few years.

The final details of treatment have not been worked out but one firm started a pilot plant over 18 months ago and has been producing columbite regularly. Fortunately the granite carrying the columbite is much decomposed so that no crushing or grinding is necessary, and the whole of the rougher concentration is carried out by means of diaphragm jigs. Owing to the small particle size of the columbite, 55 per cent being -100 mesh, it seems probable that other methods may have to be developed, such as spirals, etc., to supplement the jigs.

The decomposed granite is tipped on a grizzly and the undersize broken by a monitor through a gravel pump and a $\frac{1}{2}$ in. grizzly. The undersize is then concentrated using further jigs, the hutch concentrate dewatered and cleaned in two sets of jigs. The resulting concentrate is next dressed by classification into two sizes which are tabled, making five products. The first cut is in rich (as a little magnetic cassiterite occurs in the granite) and is dried, screened and dressed on a pneumatic table.

The second and third cuts are dried and passed through a magnetic separator, making a columbite concentrate, containing some zircon and thorite which is removed by electrostatic separation. The non-magnetic fraction is retabled to concentrate any residual columbite and non-magnetic cassiterite, whilst middling fractions received a

somewhat similar treatment. The ground contains about 4 lb. per cu. yd. of columbite and some 1 to 1.5 lb. cassiterite.

POSSIBLE DEVELOPMENTS IN TREATING PRIMARY COLUMBITE

The difficulty in dealing with this decomposed granite lies in the fact that the columbite is very fine and that much clay is present. It would appear that the possible solution may be to screen at a finer size thereby eliminating much of the gangue followed by de-sliming using cyclones cutting at say 10-15 microns, as a jig plant probably only recovers about 72 per cent of the values, some of which is -200 mesh. Most of the fine columbite would then be concentrated in a much smaller bulk, and handled more readily. Research has been undertaken on flotation but unless some such pretreatment is adopted it is difficult to see that it will be satisfactory.

Again, if the coarse waste is removed as well as the slime, the possibility of a wet magnetic separation technique should not be overlooked as a means of producing a rougher concentrate of the very fine columbite. To date no commercially satisfactory machine has been developed with sufficiently high field intensity.

TRANSPORTABLE EQUIPMENT—I

Transportable Testing and Milling Equipment for the Mining Industry

The rising world demand for metals has given an impetus to prospecting and mining activities in under-developed regions where serious difficulties are presented by rugged terrain and lack of efficient overland communications. The scope for transportable equipment has been surveyed previously in *The Mining Journal*, and attention has been drawn to the use of trailer caravans, often in association with helicopters, in prospecting and mine development operations. A further step in the construction and use of mobile equipment for the mining industry has recently been taken by the Denver Equipment Company, United States, in the construction of mobile laboratories and treatment plants for use in less accessible areas. The following article, the first of two parts, describes certain of these equipments, and in so doing adds to the conception of the self contained mobile mining camp.

The uses of mobile mining equipment are extremely varied, ranging from the small outcrop drilling rig to the motorized first-aid station serving a group of smallholdings. The main applications, however, may conveniently be classified under four headings: in proving operations; in the early development of orebodies; in the exploitation of small, rich orebodies; and in the exploitation of small mineral reserves in the same region, but where a central treatment plant may not be suitable.

SPECIALLY DESIGNED VEHICLES

Experience has shown that the requirements of the mining engineer can only be met satisfactorily by vehicles of special design and construction, capable of standing up to the physical and climatic conditions of the territory to be covered. The units themselves must be able to withstand hard usage and handling, and yet be light enough to be readily transported across difficult country. They must be so compact that a self-contained plant can readily be carried in a truck and/or trailer of reasonable size. It must be possible for two or three inexperienced operators to set up machines quickly and easily on reaching the site and to return them with equal ease to the carrier vehicles for removal from one locality to another. Finally, the equipment, once set up, must be capable of giving as efficient service as comparable static plant.

The design and construction of mobile plants is, there-

fore, the product of intimate knowledge of both mining equipment and the requirements of the specific task or tasks which particular units will be called upon to undertake, as well as of transport vehicles and their limitations. It is noteworthy that some leading manufacturers of mining equipment are now concentrating on this relatively new field, in order that the usual equipment in which they specialize may be made available in mobile form.

In situations where mineralization consists, for example, of large particles widely disseminated throughout a lode or host rock, the information yielded by diamond drilling may well require to be supplemented by a bulk sampling operation with pilot milling. Should the orebody prove to be uneconomic, however, all financial outlay on buildings, foundations and fixtures of a permanent type would be lost, together with the expenditure on erecting and dismantling plant.

Mobile equipment may involve a higher initial expenditure, but this is more than offset by the fact that, should prospecting or early development work prove abortive, the entire mining camp can be transported to another site with minimum loss of time and money. Mobile testing plants thus offer important advantages to mining companies engaged in extensive programmes of exploration. It is also evident that portable ore dressing units staffed by Government experts might be used to stimulate mining activities by assisting small operators to prove deposits of limited extent.

A striking example of the role of the mobile laboratory in mining development is afforded by a mobile unit supplied by the Denver Equipment Co. Ltd., which is being operated in Mexico by the Comision de Fomento Minero with the collaboration of the U.S. Bureau of Mines under the U.S. Technical Assistance programme.

One of the directions in which the Comision is encouraging small mines is by helping them to obtain new equipment to improve mining and metallurgical results. In many instances the equipment is provided under a rent contract with a purchase option. The amount paid for the rent is applied to the purchase price, if the option is taken.

FEATURES OF CONSTRUCTION

The mobile metallurgical laboratory used by the Comision has been designed to work on ores susceptible to concentration by flotation, table and jig, or any combination of the three. It will make tests and check mill operations at first hand in the various mining camps scattered over Mexico.

The unit is equipped with a laboratory sized 2½ in. x 3½ in. Denver jaw crusher and ball mill and with two Denver Laboratory Flotation Machines of 500 and 1,000 grams capacity respectively. By the use of appropriate reagents a wide range of concentrates can be handled. The tailings from the flotation machine when passed over the Denver-Wilfley Concentration Table may yield values not susceptible to flotation. A 3 in. x 4 in. laboratory sized Denver jig saves values which separate from the gangue in relatively coarse sizes and may thus avoid the necessity for fine grinding.

The laboratory work table is made of aluminium and is levelled by means of adjustable legs bolted on after it has been partially withdrawn from the truck. For stability its weight is taken by the end gate and water tank. Apart from the two flotation machines and the jig, which are bolted to the top, it carries the rollers which support and drive the ball mill. Adequate compartments are provided for reagents, pans, screens, etc.

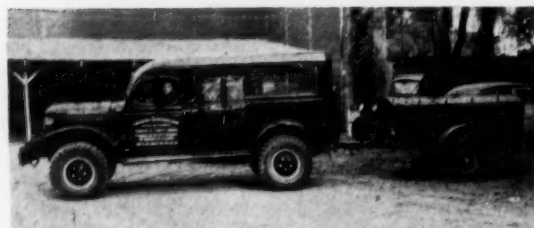
The unit is powered by a petrol-driven 3.5 kW generator, which is bolted to the truck floor and connected to a switch-board built into the table. Water is stored in a 60 litre tank and delivered by a pump of 7½ g.p.m. at 15 p.s.i. to the concentrating table, jig, flotation cells or ball mill. A 12 in. x 3 in. Denver laboratory vacuum filter for rapid dewatering of slimes is bolted to the end gate of the truck and vacuum for it is created through a tube from the truck motor.

AN IMPROVED UNIT

As a result of the use of the portable laboratory in Mexico, the manufacturers have been called upon to submit a quotation for an improved unit to the Colombian government. The portable laboratory proposed is designed to be housed in a 16 ft. x 8 ft. van type truck body and has all the standard and pieces of laboratory equipment used, including such items as a self-contained pressure water system, power and lighting system and a crushing plant



The mobile laboratory used in Mexico



The laboratory packed for transportation

separated from the balance of the unit to eliminate the dust problem.

The equipment provided in the improved portable laboratory includes a 3½ in. x 4½ in. jaw crusher, together with jigs, a pulverizer, ball mill and two laboratory flotation machines of 500 grms. and 2,000 grms. capacity respectively.

A further improvement is that certain machines contained in the laboratory are fitted with individual motors, drives and switches, which can be powered by 5 kW generator set. This set provides sufficient power for all the motors—which will only operate intermittently, leaving an excess of power which can be utilized for lighting. Another recommended improvement is the installation of the water tank at an elevation of from 6 ft. to 8 ft. for gravity flow to be controlled by valve.

British Drills in the World Market

One of the latest types of Holman rock-drill, the Dryductor Drill, has been approved by the American Bureau of Mines, as conforming to U.S. standards of dust-control. Last February, the Dryductor Drill was first presented to the industry in general at a symposium on rock-drilling held by the American Institution of Mining Engineers. Sales of these tools on the American market, one of the toughest in the world for mining machinery, have already begun. Some 30 Dryductor Drills are now in use in American mines.

The latest version is the Short Dryductor Drill, in which a 6-inch reduction in length has been achieved while maintaining a high standard of performance. It employs a lighter blow with a greater percussive rate. When drilling upwards in low headings, the compactness of the drill contributes directly to efficiency, as it allows fewer changes of drill steel for a given length of bore. In the roof-bolting technique now widely used in American coal mines, this is particularly important as also is the ability to drill dry, without subjecting the operator to the fall of dust or slurry. Both these requirements are satisfied by the Short Dryductor Drill.

In keeping with this expansion of markets to the U.S., a programme of demonstrations and tests of Holman Bros. equipment is now taking place in France. Drills being tested at various sites include the Dryductor Drill, and the most powerful model in the range, the Silver 3.

The demonstrations follow the easing of French import restrictions on this type of equipment. These demonstrations being held at sites as widespread as Valenciennes, Paris, Grenoble and in the Pyrenees. Among the concerns interested are Charbonnages de France (French equivalent of the National Coal Board) and the Société des Constructions de Batignolle. Tests by the Charbonnages de France are under laboratory conditions.

The Coal Industry

(From Our Coal Correspondent)

In Britain the National Coal Board and the Mineworkers' Union have reached agreement on the standardization of the day wage structure of the industry. No industry is more prone to grading difficulties than mining and the present proposals are the result of work which has been going on over a period of many years. The problem has been tackled in three stages; firstly, some 6,000 job names in the various coal fields were re-classified into 361 different jobs. Secondly, these jobs were graded in accordance with their relative importance. Underground work was classified into five grades, surface work into five grades, and the work of craftsmen into three grades. Finally, the wages to be paid, for each of the thirteen grades were negotiated.

The implementation of the new wages structure will raise the minimum wage for underground workmen from the existing £7 15s. per week of five working shifts to £8 6s. 6d. This, however, is the minimum increase in weekly wage and for men re-classified as Grade I underground the new wages scheme will give an additional £1 15s. 6d. per week. Provision is made in the new structure for payment to the miner in excess of the minimum rates—the maximum Grade I underground rate being £11 17s.

It is estimated that these wage increases will cost the industry some £13,000,000 a year, roughly equivalent to 1s. 3d. per ton of coal.

Production from British collieries is still far from reassuring and so far this year, output is 1,000,000 tons down on last year's figure at this time. Much of the blame for this fall in production is attributed to the prolonged cold spell which had the effect of hindering the movement of surface wagons. To fill the gap between supply and demand, coal is being imported on a much bigger scale than in recent years and Britain has contracted to buy 4,000,000 tons of foreign coal in the four month period ending in April.

EUROPEAN WAGE STRUCTURE

Within the European Coal and Steel Community wage increases have recently been announced for the Belgian and the Saar miners. In Brussels a mining committee approved pay rises for Belgium's 150,000 coal miners. Surface workers were awarded a six per cent increase in wages and underground workers a seven-and-a-half per cent increase. Belgian coal output—currently some 29,000,000 tons per year—is slowly declining. Costs of production are high due to the difficult working conditions. In an attempt to increase productivity and reduce costs, several marginal mines in the Borinage area are to be closed over the next four years and the miners thus freed will be transferred to more productive fields.

In the Saar, which has the highest O.M.S. in the Community, wages have recently been increased by an average of 4.5 per cent. These wage awards have not gone unnoticed by the West German Miners' Union—currently strongly pressing a claim for a 12 per cent wage increase. So far the Mine Owners' Association has flatly refused this demand nor has it made any compromise offer. Unrest among Ruhr miners has been evident for some time and as reported in *The Mining Journal*, February 25, token strikes have taken place. Should agreement over the present wages situation not be reached there seems little doubt that a full-scale strike of mineworkers will result. Such a strike would have a catastrophic effect on Western German economy, as pithead stocks at present amount to little more than one day's output.

The recently announced final figures of U.S. coal production in 1954 reveal a continuance of the downward trend which started back in 1948. Output of bituminous coal at 392,000,000 s.tons was 14.3 per cent below that of the previous year whilst anthracite production slumped 12.4 per cent. Prices for both fuels have been cut in an endeavour to preserve markets but gaseous and liquid fuels continue to increase sales rapidly at the expense of the coal industry. The anthracite industry is suffering hardest from the impact of these competitive fuels and appreciable unemployment has resulted from the drop in demand and this situation is likely to continue.

The future for the bituminous coal miners is not quite so bleak and with U.S. business activity picking up momentum following last year's temporary recession the demand for coal is increasing. However, many of the traditional markets for U.S. coal have gone for ever, an outstanding example being the railways where the widespread introduction of diesel locomotives has cut the use of steam coal by no less than 112,000,000 tons a year in ten years.

The coal mining industry is strenuously pressing the Government to restrict imports of residual fuel from Venezuela and other foreign countries with low labour costs.

REVIEWS

Minerals in World Industry, by Walter H. Voskuil. Published by McGraw-Hill Book Company. Pp. 324 with illustrations, maps and index. Price 43s.

The author of this work is chief mineral economist, Illinois State Geological Survey and professor of mineral economics, College of Engineering, University of Illinois. His use of statistics and historical background in explanation of modern products and practices is particularly skillful.

The book is concerned primarily with the part played by minerals in economic productivity, and in the establishment and maintenance of a high standard of living. Beginning with a study of iron as the core of productive society based on minerals exploitation and treatment, the work continues to consider fuels—coal, petroleum and natural gas—and alternative fuels. In subsequent chapters the author describes the distinctive use of each metal and mineral in the productive economy and discusses the relationship of each to iron.

The work is also concerned with the international political aspects of mineral resources. An informative volume.

The Strength of Copper Tubes and Cylinders. Published by the Copper Development Association. Pp. 43 with illustrations. Available free on application to the Copper Development Association.

Engineers who are interested in copper tubes and cylinders will welcome this new C.D.A. booklet. Within its pages are considered the effects of working conditions, while after referring to recently published research work, guidance is offered on design principles. It is hoped that a better understanding of the relevant properties of the metal will lead to more efficient and more widespread uses of copper for pipe lines and cylinders.

The booklet is well illustrated and includes a bibliography, a list of British Standards and some alignment charts. The C.D.A. is situated at Kendals Hall, Radlett, Herts.

MACHINERY AND EQUIPMENT

New Vehicles for Borneo Oilfields

The first of four vehicles fitted with breakdown equipment especially designed and completed by M. O. Harper Ltd. in collaboration with Shell engineers, is now *en route* to the Seria oilfield, British Borneo. Previously, such equipment has been made only in the United States.

The basic vehicles are 6-wheeled 6-wheel drive Scammell Constructors fitted, as is usual on oilfield trucks, with Darlington model 70 winches behind the cabs. The new equipment consists of a power-driven crane with twin jibs and a specially designed all-steel body. Power for the crane, which is taken



The Scammell 6 by 6 constructor fitted with special winching and breakdown equipment

from a power take off on the truck gearbox, drives two clutch operated reversing gearboxes each of which is connected to a 10,000 lb. winch. The reversing boxes and the winches are built into the crane structure, one winch for each jib and each box incorporating a double multiplate clutch connected to an operating lever on either side of the vehicle. It is thus possible to operate either one or both jibs simultaneously, from either side of the vehicle.

The foot of each jib is carried on a universal pivot so that it can be swung through an arc of approximately 135 deg. from the centre rear of the truck. The luffing action of each jib is controlled by single hand-operated winches built into the crane structure.

The specially designed all-steel welded body is fitted with a steel pumping plate at the rear and a tool box at each side. Its under frame is fitted with heavy duty sheaves and rollers which guide the rope from the truck winch under the floor and out at the rear end through an aperture in the bumping plate.

Although the basic vehicle has already been in use with similar heavy winches and oilfield bodies, carrying up to 25-ton loads, these new machines with their powerful winching capacity, will be particularly suited to certain operational work in the oilfields such as laying pipelines, erecting drilling rigs, and for breakdown recovery in jungle conditions. Similar equipment, on a Leyland chassis, is on order for Nigeria, where oil is being sought by the Shell D'Arcy Petroleum Development Co. of Nigeria Ltd.

Cure for Water Intake

The technical cure for water intake in a compressed air supply is to cool the compressed air to a temperature well below that of the inlet temperature, remove what water collects and then re-heat. As in many instances this is too elaborate and costly a process, in practice cooling takes the form of inter and after coolers and wherever water collects it is automatically removed. Under such conditions, however, the air is at or near 100 per cent saturation and any subsequent cooling which may take place on movement along the water line must result in water troubles.

The only satisfying method of dealing with this moisture is to use some form of extractor device and the Victor Aridifier, manufactured by Victor Products (Wallsend) Ltd., has been designed for this specific purpose with or without an after cooler.

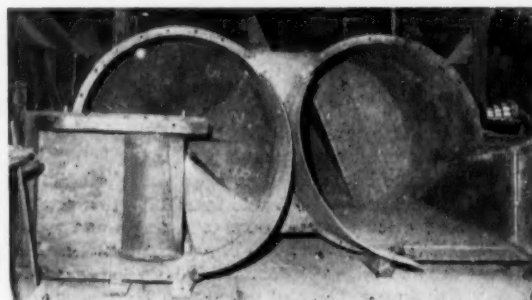
The Victor Aridifier comprises a number of free-spinning rotors mounted on a central spindle, and the action of the air in passing up through the Aridifier spins these rotors rapidly in opposite directions. The effect is to cause a large number of rapid changes in the direction of the air stream flow, resulting in water and other impurities being thrown out by centrifugal action. Victor Aridifiers are graded in four styles ranging from a free air capacity of 2/15 cu. f.p.m. at 40 lb. p.s.i. to 620/2100 cu. f.p.m. at 150 lb. p.s.i. Pipe sizes range from $\frac{1}{2}$ in. B.S.P. to 3 in. B.S.P. flange.

Spiral Chute Loading

A problem encountered in the installation of spiral chutes at Lynemouth Colliery was to find a unit which provided a smooth transfer of both the main coal flow from the in-feeding belt heads and fines removed from bottom belt scrapers to the main spiral. There was a large quantity of fines produced at the plough-off points, and because they were naturally damp they would not flow at an angle of less than 70 deg., eliminating the use of subsidiary duff chutes to bridge the gap to the main spiral.

A solution was found in the adaptation of the standard twin spiral hopper. This consists of two standard Qualter Hall 5 ft. dia., 6 ft. 4 in. long sections of spiral chute set side by side and fastened together. There is a left-hand pitch in one and a right-hand pitch in the other. A section of the periphery is cut away and a specially constructed duff chute fitted into each cylinder at 70 deg. and coincident with the bottom belt scraper position. To the bottom of these sections is fitted an outlet common to both. It is bolted to the flanges of the cylinders and is at an overall angle of 45 deg. From the outlet, an intermediate delivery chute at 45 deg. is fitted to couple to the inlet in the main spiral body.

The two conveyor delivery heads are mounted above their respective hopper sections so that the main coal flow feeds direct on to the cast-iron segments forming the pitch. The scraper or rapping roller, normally fitted 2 ft. 6 in. behind the delivery drum, diverts duff and fines into the duff chute and so on to the pitch at a point below the main coal stream. The flow of large coal carries the duff down through the hopper into the spiral chute.



At left, hopper complete with 30 in. delivery drum in position. At right, hopper without segments, showing duff chute

Other than the casting of the right-hand pitch, which is not available from the manufacturers and was made at the Area workshop, construction was carried out at the colliery. Several units have been made and have been in use for over a year with a minimum of trouble or maintenance cost.

Australian Winder Order

The General Electric Co. Ltd. has received an order through its Australian subsidiary, The British General Electric Co. Pty. Ltd., for an electric winder equipment for Cessnock Collieries Ltd., Australia. The equipment to be supplied includes a single drum winder 14 ft. in diameter designed for an output of 248 tons per hour winding from a depth of 1,227 ft. The reduction gear and brake gear will be supplied by the Erith Works and the remainder of the mechanical parts will be manufactured in Australia from design data supplied from Erith. The motor and control gear will be manufactured at the Witton Engineering Works of the G.E.C. The order is valued at some £A100,000.

METALS, MINERALS AND ALLOYS

COPPER.—As foreshadowed here last week, U.S. producers were finally compelled at the beginning of this week to raise their price by 3 c. to 36 c. per lb. This increase cannot be expected to attract more copper to the States while the London Metal Exchange price remains at around 45 c. Marketwise 36 c. does not mean much anyway with custom smelters and dealers already getting above 40 c. The Chilean authorities are understood to have been pressing for a further price increase on their contract deliveries to the States, and it may of course be that this new price rise carries with it some understanding regarding the volume of future Chilean deliveries. On the other hand there cannot immediately be very much room for manoeuvre on current Chilean production in view of the Minister of Mines' statement this week that Chile's entire production for the first six months of this year (estimated at 200,000 tons) has already been sold, with several European countries bidding for deliveries later in the year.

Aside from further price increases, American copper users' hopes must reside in diversion of government-controlled copper, coupled with a further clamping down on exports. In this connection the proposals submitted to Washington last week by the brass industry (and summarized here a week ago) were subsequently endorsed by representatives of the copper wire mills on all points though the latter were less specific in their insistence that copper should actually be withdrawn from the stockpile, recognizing, no doubt, the legislative obstacles to be overcome.

Subsequently the copper producers, who were in conference with the Business and Defense Services Administration in Washington last Friday, made it clear that they did not go along with the proposals urging the diversion of copper earmarked for the stockpile because the amounts involved would be relatively small, and that they did not support proposals to withdraw copper from the stockpile. All parties, however, seem to be agreed on the need for stricter export quotas for scrap until June 30, followed by a complete embargo for the second half of the year, although the producers have again pointed out the impracticability of embargoing exports of copper refined from foreign ores.

Meanwhile consumers are stated to be faced with a prospective shortage of 11,000 tons of copper in April, and 6,000 in May. If these figures can be accepted as accurate, it looks as if the U.S. consumer is going to have to go short of copper these next few months unless prices are boosted much nearer to those ruling on the London Metal Exchange. Certainly the U.S. producers are showing no particular optimism regarding their ability to meet the stated deficiency through expanded domestic production, and they made it clear at their session with the B.D.S.A., that they doubted being able to mine 60,000 tons of additional copper this year over and above the present rate of output.

Notwithstanding all the agitation over the supply position in the States, we have some difficulty in believing that the situation is quite as bad as it would appear. European consumers have made it quite clear that it is cheaper to pay 45 c. for copper than to go without, and the fact that there has been no heavy buying by Americans at world prices suggests to our way of thinking that the situation is not as yet all that tough across the Atlantic.

The strike which was threatening last week at Chuquicamata occurred on Friday, but proved to be only a one-day stoppage, the men returning to work after the Union leaders had agreed to a ten-day postponement pending further negotiations. Certainly any prolonged stoppage at this, or any other major mine, at this juncture would be disastrous. On the other hand, this week's U.S. price increase can have done nothing to facilitate the company's negotiations. The Union is reported to be asking for 100 per cent wage increase against the com-

pany's offer of 15 per cent. This is quite a gap to bridge.

LEAD AND ZINC.—American lead producers report a continuing strong demand from home and export markets which has kept the domestic price firm at 15 c. This position is reflected in the continued improvement in the statistical position. At the end of February producers' stocks stood at 65,000 tons, a decrease of 20,000 on the month. This big decrease appears largely to be accounted for by deliveries to the stockpile, but, significantly for the first time for a number of months shipments to consumers were in excess of production, so that we would have seen a reduction in stocks even without stockpile support.

The tight position in special high grade zinc continues while demand for Prime Western has also been considerably better in the past week or so.

Some alarm is being expressed regarding the tough wage demands presented to General Motors which carry with them the implication of a possible strike. On the other hand the trade took comfort in the forecast by Mr. Felix Wormser, Assistant Secretary of the Interior, that an official announcement might soon be expected regarding future policy on domestic lead and zinc after the expiry on June 30 next of the Government's present emergency buying programme.

The Senators from Utah seem to be keeping up a steady barrage against the Reciprocal Trade Agreements Act. Following the proposed amendments to the Administration's foreign trade bill, reported here last week, Senator Bennett has now introduced an amendment proposing an import duty of 2 c. per lb. whenever imports would otherwise have had the effect of forcing domestic prices below the levels set by the Government to maintain a mobilization base for national defence and security. By way of illustration Mr. Bennett points out that this proposal would at the present time have no effect on lead at 15 c. but that the tariff would be invoked for zinc until the domestic price rose to 13 c.—the mobilization base price.

TIN.—No further news has come through this week regarding the Senate's inquiry into the continuation of the Texas tin smelter. Meanwhile, a bill was introduced into the Lower House last week by Mr. Clark W. Thompson, a Democrat representative from Texas, calling for the continued operation of the smelter for a further year in order to allow time for its sale as a going concern. It would appear that this year it is this particular aspect of the matter which the Texas smelter lobby is stressing in their campaign to keep the smelter going. So far as the tin market is concerned, the real factor is, of course, not whether the smelter keeps going but whether Washington continues to stockpile tin, pending the bringing into operation of the I.T.A.

In any event the list of potential buyers of the smelter must be very short. No doubt Billiton would be given a first refusal, but presumably the original capital value of the smelter would have to be very drastically written down before this company, or any other, could be interested and even then the purchaser would probably require greater freedom of action than the smelter has at present regarding the proportion of low grade ore taken in.

The Indonesian contract expired about a fortnight ago and it appears that any consideration of an extension of this agreement must await Washington decisions regarding future tin policy in general and the smelter in particular. Perhaps if the likelihood of any continuation of the Indonesian contract were to appear less probable that country might be exhibiting more haste in ratifying the I.T.A.

ALUMINIUM.—Following the Washington enquiries into the aluminium supply shortage (reported in this column a fortnight ago), the O.D.M. has now ordered the diversion to industrial users of 75,000 tons of aluminium scheduled for the

U.K. PRIMARY METAL STATISTICS—1952-1954
(long tons)

	Refined Copper			Lead*			Slab Zinc			Tin Metal		
	1954	1953	1952	1954	1953	1952	1954	1953	1952	1954	1953	1952
U.K. stocks beginning period	37,246	91,548†	87,251‡	26,887	23,090	77,167‡	27,652	166,050‡	39,659‡	3,085	4,225	8,004
Imports	267,895	227,397	212,086	197,517	179,125	146,944	154,678	130,473	228,852	2,404	1,038	2,870
Production	136,480	96,968	146,401	76,049	73,529	86,070	81,239	72,711	68,733	27,475	28,860	29,521
Consumption	438,651†	243,439	347,646	257,712	221,172	196,128	240,362	193,058	170,885	21,163	18,634	22,354
Exports and Re-exports	25,934	21,467	801	11,465	24,899	42,731	1,680	10,475	146	8,585	14,450	21,710
U.K. stocks end period	45,876	37,246	91,548‡	31,173	26,887	75,510‡	49,554	27,652	166,050‡	4,347	3,085	4,225

(Source: British Bureau of Non-Ferrous Metal Statistics)

† Figures for 1954 include secondary refined copper — probably 20-25 per cent English refined from domestic ore and secondary metal

‡ Including stocks held by Government

* Includes imported virgin lead and

stockpile during the first half of the current year, which presumably will in effect mean that users will receive this tonnage over the three month period April to June. No mention has been made as yet of when the diverted metal is to be made good to the stockpile, which has been interpreted in some quarters as a sign that the Administration does not see an early end to the tight aluminium position. It is understood that a further official review of the situation may be made early in May.

Subsequently the U.S. Bureau of Foreign Commerce announced that second quarter export licences of aluminium scrap are to be limited to 9,000 tons while the licensing of the export of primary and secondary ingots will be restricted to last year's level, namely, about 200 tons a month.

MOLYBDENUM.—According to the Bureau of Mines, U.S. consumption of molybdenum declined to 24,710,000 lb. in 1954. This total is the lowest since 1949 and compares with 31,193,000 lb. in 1953. The fact that, in spite of this decline, production rose by about 1,000,000 lb. to 38,427,000 lb., while stocks declined by 6,000,000 lb. to 5,317,000 lb., is accounted for by an increase of about 11,000,000 lb. in exports which reached the record total of 64,776,000 lb.

The Titanium Metal and Alloy Co. of Great Britain is reported to have placed a trial order for titanium slab with the Nisino Trading Co. This Japanese firm is apparently selling on behalf of the Kobe Steel Manufacturing Co.

NICKEL.—Following the decision by the O.D.M. at the beginning of February to make available an additional 1,000 tons of nickel to industry during the first two months of the year, it is now announced that a further 1,500 tons are to be made available during the second quarter of the year. It will be recalled that the action taken in February was in response to a recommendation from the Business and Defense Services Administration that Washington should guarantee this industry a minimum supply of 100,000 tons this year for defence and commercial production. If this target is to be met it is estimated that Washington will have to release an average of 500 tons a month throughout the remainder of this year.

QUICKSILVER.—Quicksilver prices have eased a little in London this week and are being quoted at £108 10s. to £109 per flask. Buying remains very much on a hand to mouth basis although the supply position is easing.

TITANIUM.—The price of titanium is gradually coming down. Price cuts initiated last year by Du Pont brought the level down from \$5 to \$4.50. Now the Titanium Metals Corporation have taken the lead with a 55 c. cut bringing their price down to \$3.95. Other producers are expected to follow suit.

Du Pont are to establish a titanium plant at Jacksonville under the stimulus of a Government quick tax write-off allowance. It is understood that the titanium produced will be purchased by the U.S. Government.

TUNGSTEN.—London prices have eased appreciably this week and are now being quoted at 215s. to 220s. per unit.

The South Korean Government will offer a further 300 tons of ore at its fourth auction to be held on April 10. The bids of three New York firms were accepted for the March sales—Metallock, Philip Brothers and Wah Chang.

URANIUM.—Reports from Vancouver suggest that the Rio Canadian Exploration Company is about to embark on an extensive uranium exploration programme in British Columbia. So far as we know there have so far been no major uranium discoveries in this province. Rio Canadian represents the joint enterprise of the Rio Tinto Company and Sogemines.

The London Metal Market

(From Our Metal Exchange Correspondent)

Markets have developed as expected with a firmer undertone all round owing to especially good demand in the States during last week.

There have been considerable fluctuations in the copper market, but the turnovers have tended to increase again. Supplies of copper are by no means plentiful, with most producers sold out well into the third quarter of the year. At the moment the Chilean authorities have suspended sales, but it is believed that these will recommence again on April 1 for August/September shipment metal. In the meantime the strike situation there remains obscure as the workers have only postponed strike action until early in April, and it is by no means certain that an agreement will have been reached by then. The demand in Europe has lessened slightly, but if

the recommendations of almost the whole of the copper trade in America are accepted and export quotas for copper and copper scrap are halved for the second quarter and reduced to nothing for the rest of the year, then continued pressure on the London Exchange must result. In the States itself domestic producers have now raised their price to 36 c. per lb., but this is purely a domestic affair and can have no effect on the world price structure. In the U.K. the reduction in the copper stocks in L.M.E. warehouses published on the new basis last Monday did not show such a severe drop as many people had anticipated, the only real alteration being the disappearance of 1,000 tons in Manchester which were fairly generally known not to be available to the market.

The other three metals have not been active, and the alterations in the backwardations are due entirely to end-of-month considerations. So long as the supply and demand positions are so nearly in balance with the aid of the American stockpile programme, the marginal tonnages and lack of need for hedging must keep turnovers small on the London market.

On Thursday morning the Eastern price for Tin was equivalent to £728½ per ton c.i.f. Europe.

Closing prices and turnovers are given in the following table:—

	March 24		March 31	
	Buyers	Sellers	Buyers	Sellers
Copper				
Cash	£356	£357	£363½	£364
Three months	£347½	£348	£354½	£355
Settlement		£357		£364
Week's turnover		3,600 tons		5,020 tons
Tin				
Cash	£713	£714	£716	£717
Three months	£714½	£715	£717	£718
Settlement		£714		£717
Week's turnover		535 tons		510 tons
Lead				
Current half month	£104	£104½	£103½	£104
Three months	£103	£103½	£103½	£103½
Settlement		£104		£104
Week's turnover		2,575 tons		1,475 tons
Zinc				
Current half month	£88	£88½	£88	£88½
Three months	£86½	£87	£87½	£87½
Settlement		£87		£87½
Week's turnover		3,325 tons		2,400 tons

OTHER LONDON PRICES — MARCH 31

ANTIMONY

English (99%) delivered,	
10 cwt. and over	£210 per ton
Crude (70%)	£200 per ton
Ore (60% basis)	22s./24s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade)	£519 per ton
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OTHER METALS

Aluminium, 99.5%, £163 per ton	Osmium, £30 oz. nom.
Bismuth	Palladium, £6 5s./£6 15s. oz.
(min. 2 cwt. lots) 16s. lb.	Platinum, £27/£27 15s.
Cadmium (Empire) nominal	Rhodium, £41
Chromium, 6s. 5d./7s. lb.	Ruthenium, £16 oz.
Cobalt, 21s. lb.	Quicksilver, £108 10s./£109
Gold, 251s. ½d.	ex-warehouse
Iridium, £30/£32 oz. nom.	Selenium, 43s. nom.
Magnesium, 2s. 4d. lb.	per lb.
Manganese Metal (96%-98%)	Silver, 77d. f.o.z. spot and
£255/£265 according to	76½d. f'd
quantity	
Osmiridium, £40 oz. nom.	Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth	65% 8s. 6d. lb. c.i.f.
	60% 8s. 3d. lb. c.i.f.
Chrome Ore —	
Rhodesian Metallurgical (semi-	
friable) 48%	£13 per ton c.i.f.
" Refractory 45%	£13 per ton c.i.f.
" Smalls 42%	£10 2s. 6d. per ton c.i.f.
Magnesite, ground calcined ..	£26-£27 d/d
Magnesite, Raw	£10-£11 d/d
Molybdenite (85% basis) ..	105s. 3d.-108s. 1d. per unit c.i.f.
Wolfram and Scheelite (65%) ..	215s./220s. c.i.f.
Tungsten Metal Powder ..	19s. nom. per lb. (home)
(98% Min. W.)	
Ferro-tungsten	16s. nom. per lb. (home)
Carbide, 4-cwt. lots	£37 6s. 3d. d/d per ton
Ferro-manganese, home	£54 15s. 0d. per ton
Manganese Ore Indian c.i.f.	
Europe (46%-48%)	76d./78d. per unit
Brass Wire	3s. 3½d. per lb. basis
Brass Tubes, solid drawn ..	2s. 8½d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

Stock markets this week remained quiet although the undertone was firm. After Friday, the lack of newspapers caused a blanket to descend which kept the general public in the dark with regard to company results and price movements.

The South African budget had little effect upon Kaffir shares. While there was some disappointment that no major tax concessions were granted, the conservative financial policy being followed by Mr. Louw was approved. Among finance houses, few major changes took place, but investment buying of General Mining shares, Consolidated Goldfields and Anglo American Corporation was evident. West Rand Investment Trust shares again hardened and the better coal prospects were recorded by a further rise in Vereeniging Estates.

Individual mines, recorded few changes of note. Profit-taking in Far West Rand shares caused a fall in Dominion Reefs and Stilfontein. Randfontein lost more of their recent gains but Durban Deep were again sought after. Buying was reported to emanate from the continent and the Cape.

In the Orange Free State, news that the money from the sale of the Freddie's South shaft would be used to finance the further development of the northern property caused another setback. Free State Geduld dropped due to doubts concerning the immediate value of the company's acquisition. The new ground contains low grade ore, and there seems to be a case for an adjustment in the lease terms. Loraine fell due to continued rumours that the mine may be running into the same difficulties as Freddie's Consolidated. The tone in the Orange Free State market also lowered Ofits, Virginia and Welkom.

Among West Africans, Konongo remained unchanged despite the big increase in profits and the higher dividend. This may well be a case in point where the news has not reached the public. Western Selection rose. Arrangements are in hand for floating the company's new interest in copper/nickel and uranium deposits in Canada.

Cam and Motor hardened as the time for taking up the new shares approached. Some buying by Rhodesian residents was

reported. The struggle for control of Camp Bird was reflected by a further rise in the shares to 17s. The unhappy financial position of Brazil and the prospect of a Presidential election in that country during the summer caused a further setback in St. John d'El Rey.

Coppers were strong. Chartered were again to the fore, supported by strong investment buying. Messina were quoted ex rights for the composite units which started at £2 each. The old shares went over £8 at one time. Rio Tinto reacted to the go ahead policy of the Board which is now considering the investigation of uranium propositions in British Columbia. There has been more interest in Mineral Separation. The company holds large interests in the leading Rhodesian copper mines and the price reached 15s. at the end of the week. Esperanza alone turned easier. The result of a poll confirmed the election of the Board's nominee. The chairman hinted at a dividend next year.

Eastern tin shares were featureless and may well remain so until the future policy of the United States with regard to the metal is known. The agreement with Indonesia ended on March 20. In the Nigerian market, prices were also affected by this factor and the leading shares lost the turn. Beralt Tin and Wolfram were easier following the fall in tungsten.

There was little interest in lead/zinc producers and most Barriers and Rhodesian Broken Hill fell sharply. An exception here was Consolidated Zinc which rose despite being quoted ex dividend. This company is, of course, concerned in smelting and processing as well as mining.

Among miscellaneous base metals, interest in the South African collieries was apparent and leading shares all went ahead. The improvement in the London industrial market was underlined by a further rise in Turner and Newall.

Canadians were better and more interest was shown in base metal projects. The increased activity by Canadian and American steel companies, and the interest of Krupp in the Ungava iron ore deposits was reflected in a rise in Hollinger.

FINANCE	Price	+ or -	RAND GOLD contd.	Price	+ or -	DIAMONDS & PLATINUM	Price	+ or -	TIN (Nigerian and	Price	+ or -
	Mar. 30	on week		Mar. 30	on week		Mar. 30	on week		Mar. 30	on week
African & European...	34		W. Rand Consolidated...	43/9	-7 1/2	Anglo American Inv. ...	8 1/2	+ 1/2	Miscellaneous contd.		
Anglo American Corp.	8	+ 1/2	Western Reefs	42/6		Casta	24/-	+ 3d	Gold & Base Metal...	2/7 1/2	
Anglo-French	21/3	-7 1/2				Cons. Diam. of S.W.A.	7		Jantar Nigeria	8/-	
Anglo Transvaal Consol.	28/9		O.F.S. GOLD			De Beers Defd. Bearer	5 1/2	XD	Jos Tin Area	13/9	
Central Mining (£1 shrs.)	40/-	+ 6d	Freddie's	4/3	-9d	De Beers Pfd. Bearer	16 1/2		Kaduna Prospectors	2/6	
Consolidated Goldfields	56 1/2	+ 1/3	Freddie's Consolidated	7/-	-9d	Pots Platinum	8/3	+ 3d	Kaduna Syndicate	2/6	
Consol. Mines Selection	38/9		F.S. Geduld	4 1/2	- 1/2	Watersal	14/4 1/2		London Tin	7/6	
East Rand Consols.	2/9		Geoffries	17/-	-9d				United Tin	3/-	+ 3d
General Mining	5 1/2	+ 1/2	Harmony	34/3							
H.E. Prop.	9/7 1/2		Loraine	10/9	-1 1/2	COPPER			SILVER, LEAD, ZINC		
Johnnies	39/3	-9d	Lydenburg Estates	20/-	-1 1/2	Bancroft	44/-	+ 1/3	Broken Hill South	50/-	-1 1/2
Rand Mines	34		Merriespruit	12/3	-6d	Chartered	116/-	+ 6 1/2	Burma Corporation	2/7 1/2	-3d
Rand Selection	41/3	+ 7 1/2	Middle Wits	17/-	-6d	Esperanza	5/-	-1 1/2	Consol. Zinc	42/9 1/2	+ 1/6
Union Corporation	40/-		Ofits	34/3	- 1/2	Messina	13 1/2	+ 1/2	Lake George	12/6	-4 1/2
Vereeniging Estates	4 1/2		President Brand	70/7	-6d	Nchanga	98/-	+ 3 1/2	Mount Isa	50/6 1/2	-3d
Wits	40/7 1/2	+ 7 1/2	St. Helena	29/-	-3d	Rhodesian Anglo-American	18/3	+ 6d	New Broken Hill	34/9 1/2	-3d
West Wits	38/9		Virginia Ord.	15/3	-9d	Rhodesian Selection	34/7 1/2	+ 1 1/2	North Broken Hill	70/-	-1 1/2
			Welkom	23/3	-1 1/2	Rhokana	37 1/2	+ 2 1/2	Rhodesian Broken Hill	11/9	-1 1/2
			Western Holdings	4 1/2	- 1/2	Rio Tinto	51		San Francisco Mines	23/9	+ 6d
						Rio Antelope	26 1/2	+ 1 1/2	Uruwira	5/4 1/2	+ 1 1/2
						Selection Trust	71/-	+ 3/3			
						Tanka	6 1/2	+ 1/2	MISCELLANEOUS		
						Thariss Sulphur Br.	6 1/2	+ 1/2	BASE METALS & COAL		
									Amal. Collieries of S.A.	51/3	+ 2/6
									Associated Manganese	38/9	
									Cape Asbestos	10/6	-3d
									C.P. Manganese	40/-	-3d
									Consol. Murchison	61/10 1/2	-7 1/2
									Natal Navigation	2 1/2	+ 1/2
									Turner & Newall	100/9	+ 3d
									Wankie	18/-	+ 1/2
									Witbank Colliery	4 1/2	+ 1/2
									CANADIAN MINES		
									Dome	\$30 1/2	+ 1/2
									Hollinger	\$31	+ 1 1/2
									Hudson Bay Mining	\$105	+ 2
									International Nickel	\$115 1/2	+ 3
									Mining Corp. of Canada	26 1/2	-6
									Noranda	\$161	+ 3 1/2
									Quebec	47 1/2	+ 1 1/2
									Yukon	4/1 1/2	+ 1 1/2
									OIL		
									British Petroleum	73/3	+ 1/3
									Apex	27/9	-1 1/2
									Attock	44/4 1/2	+ 1/2
									Burmah	5 1/2	+ 1/2
									Canadian Eagle	50/-	+ 1/6
									Mexican Eagle	20/9	
									Shell	5 1/2	+ 1/2
									Trinidad Leasehold	30/3	+ 3d
									T.P.D.	24/9	-9d
									Ultramar	29/-	+ 1/9

ECONOMIC SURVEY OF 1955

Owing to the lack of newspapers in the London area this week, we are departing somewhat from our normal policy by publishing an extended summary of the Economic Survey for 1955, to which editorial reference is made under *Notes and Comments*. The Survey was published on Tuesday. We ask the indulgence of our provincial and overseas readers.

The year 1954 was a successful one for the United Kingdom. Production continued to expand, living standards rose, there was an increase in the rate of industrial investment, and a high level of personal savings was maintained. In overseas trade and payments the United Kingdom again earned a substantial surplus on current account in the year as a whole. Though the position of the rest of the sterling area was less favourable than in the previous year, further progress was made with the rebuilding of the gold and dollar reserves in spite of substantial debt repayments. But the United Kingdom's balance of payments took a turn for the worse in the latter part of 1954.

BALANCE OF PAYMENTS

The change which came over the United Kingdom's balance of payments last autumn is brought out in the payments estimates for the second half of 1954, now published for the first time. In this period there was an overall deficit on current account of £12,000,000 (including defence aid), compared with a surplus of £172,000,000 in the first half-year. Expenditure on imports increased by £65,000,000 between the two half-years, export earnings fell by £31,000,000 partly because of the dock strike, and there was a reduction of £90,000,000 in net invisible earnings—partly due to seasonal factors.

The worsening of the United Kingdom's balance of payments was entirely on the non-sterling side. The rest of the sterling area's balance with non-sterling countries also got worse in the second half of 1954, partly for seasonal reasons. In consequence the sterling area as a whole had a deficit of £164,000,000 with the rest of the world in the second half of 1954, compared with a surplus of £171,000,000 in the first half. This change lies behind the fall in the reserves and the weakening in the market quotations for sterling late in 1954 and early in 1955.

There were two main reasons for these developments: one was an increase in the volume of the United Kingdom's imports, in part the natural result of rising industrial production and consumers' expenditure, in part due to special factors, including possibly some stocking-up in anticipation of price increases; the other was the worsening during 1954 in the terms of trade. In addition, the rest of the sterling area's position was seriously affected by the fall in wool prices last autumn.

THE EXPORT TASK

The Survey reviews the measures taken in February to deal with this situation which were designed to moderate the expansion of home demand and thereby limit demand for imports and give added encouragement to exports.

The Survey brings out the point that in 1954 the volume of imports rose comparatively little in spite of the higher levels of production and consumption. This was mainly because of the fall in stocks of food and feedingstuffs which had risen in 1953. Normally, however, higher industrial activity and incomes at home must be expected to lead to a more or less corresponding increase in demand for imports. In addition, special factors have contributed to the recent rise in the import bill. Coal output has not kept pace with rising demand; the demand for steel has run ahead of home production, in spite of the expansion of steel-making capacity in this country; and the need for imports of cereals has been increased by last year's poor harvest. Further, import prices have been rising and in February were 5 per cent above last year's average. This higher level of prices, if maintained, would add over £150,000,000 a year to the value of imports.

No offset to additional import expenditure can be expected in the near future from higher invisible earnings. Defence aid will probably be about the same this year as last. In these circumstances a continued rise in demand for imports cannot be reconciled with the need for a surplus on the balance of payments unless there is a considerable increase in export earnings.

There was a 6 per cent increase in the volume of exports last year, although Germany and Japan showed greater increases. The U.K. share of trade fell from just over 21 per cent in 1953 to about 20½ per cent in 1954. This country cannot look for a further expansion of sales to Australia and New Zealand this year. But elsewhere opportunities appear favourable particularly, North America and also in Persia and Egypt, where recent agreements have improved the prospects for trade.

The Colonies should also provide larger markets for exports as expenditure on development increases.

THE OUTLOOK FOR PRODUCTION

Last year production increased in all the main sectors of the economy in response to higher demand. The gross domestic product rose by 4 per cent and industrial production by 6½ per cent. Some further expansion of demand and production seems likely this year assuming a continuation of present trends and policies; but it is essential that a proper balance should be maintained between home demand and export demand. At home further increases are looked for in fixed investment and consumers' expenditure, both of which reached record levels last year. Industry should be able to increase output appreciably above the present level. Most of the increase in output must come from higher productivity, but there may be some further slight increase in the working population, and the full benefits have still to be felt of last year's 4½ per cent increase in the engineering labour force. Supplies of fuel and materials should be adequate for higher production, though home production of coal and steel is having to be supplemented by large imports.

The Survey lays particular stress on the importance, from the balance of payments angle, of developments in coal, steel and agriculture. Disappointment is expressed at the trend of coal production, and attention is drawn to the need for greater use of home-grown feedingstuffs to replace imports.

INDUSTRIAL INVESTMENT

There is a good deal of evidence to suggest that the demand for investment by private manufacturing industry took a fresh upward turn last year. Fixed investment of all kinds rose by 5 per cent between 1953 and 1954 (an increase of £125,000,000 at 1953 prices). Rather over half this increase was in plant, machinery and vehicles, and rather under half in new building. Most of the rise in building was in industrial and commercial building: investment in new housing rose little.

Among manufacturing industries in which further increases in investment are expected this year are iron and steel, motor manufacture, chemicals and synthetic fibres. In the basic industries the upward trend continues, and further increases (estimated at about £75,000,000) are expected in investment in coal mining, electricity, gas, rail and air transport, and Post Office services. Looking further ahead, there are major programmes of new investment in atomic energy, iron and steel, roads and railways. A massive investment programme of this kind, backed up by the Government, is itself a contribution of real significance to the maintenance of full employment.

CONSUMPTION AND SAVINGS—INCOMES AND PRICES

There was a 4 per cent rise in the volume of consumption last year. But personal savings have been between 7 and 8 per cent of total personal income after tax. The rise in personal income this year should be sufficient to permit both a further increase in the volume of consumer's expenditure and the maintenance of at least the present rate of savings.

Final prices of goods and services of all kinds rose by only about 1½ per cent between 1953 and 1954—a smaller increase than in most previous years. Wages and salaries rose by 7½ per cent in 1954, the gross trading profits of companies (with the trading surpluses of public corporations) also by 7½ per cent.

PROSPECTS FOR LONG-RUN EXPANSION

At home the main objective of Government economic policy is to ensure that, while the level of purchasing power is not so high as to interfere with the growth of exports or to attract more imports than we can afford, adequate incentives are provided for long-run expansions. This involves the maintenance of full employment, and of the kind of economic climate which is stimulating to industrial development and research and encourages a dynamic and go-ahead attitude in industry. At the same time the Government's external policies aim at encouraging the growth of international trade, since a satisfactory rate of expansion cannot be achieved here unless world trade is expanding too.

COMPANY NEWS AND VIEWS

Western Selection's Canadian Project

At the meeting of Western Selection and Development Company, Major General W. W. Richards, the chairman, commented on the company's Canadian project. As disclosed earlier, Bank of England and Treasury sanction has been received for the formation of a new company in Canada to acquire, under option, nickel-copper claims in Northern Manitoba—known as the Tow Lake claims—and uranium claims at Higginson Lake, Northern Saskatchewan.

The prospect for successful operations on both of these claim areas has been summed up in the most encouraging terms by Messrs. Koulomzine Geoffroy and Co., consulting geophysical and geological engineers of Toronto. As soon as an issue of dollar stock by the new company—which is at present under discussion—has been made in Canada and the U.S.A., development will begin. This work is, however, to be concentrated first of all on the Tow Lake nickel claims in order to test the deposits and define ore reserves.

Konongo's Increased Profits and Dividend

Profits earned by Konongo Gold Mines, the West African producer, during the year ended September 30, 1954, were much increased over those of the previous year.

Year to Sep. 30	Total Revenue £	Tax- ation £	Net* Profit £	Dividend Distribution £ %	Carry Forward £
1954	195,691	107,500	88,191	51,089 15	61,012
1953	151,901	98,000	53,901	34,059 10	56,657

* Before £10,628 (Nil) written off and £5,350 (£327), transferred to bullion reserve.

Dividends amounting to 15 per cent were paid on the issued ordinary capital of £619,259 in shares of 2s. each. This marked a rise of 5 per cent on the previous year's distribution.

Figures in respect of the first five months of the current financial year show that the improvement in profits still continues. From a total of 17,200 tons milled (13,300) a total of 15,854 oz. (13,237 oz.) has been recovered yielding profits of £77,600 as against £65,200 in the previous corresponding period. Mr. Annan is chairman. Meeting, London, May 24.

Rhodesian Corporation's Excellent Progress

A highly successful year was enjoyed by Rhodesian Corporation during the period which ended on September 30, 1954, and although revenue from all sources was increased, perhaps the most notable of the gains came from dividends and interest and from mining operations. In the case of the former, receipts rose from £28,063 to £37,867.

An important factor was the dividend paid by Falcon Mines in which a large participation is held. This property, at which a major extension programme has been in progress for some time, has reached its planned milling target and is earning satisfactory profits. Income from mining represents operations by the corporation's Fred and Redwing Mine. A considerable amount of development has been undertaken at this property in recent years, and during the past twelve months a total of 46,100 tons of ore was milled having a grade of 3.89 dwt. of gold per ton. The working profit rose to £11,595 from £3,313.

Due to favourable market conditions during the year, share dealing profits rose steeply from £5,717 to £20,944. This was also the case in respect of profits from sale of property which increased from £2,576 to £14,381. Net revenue from farms and estates rose from £18,610 to £24,833 while sundry revenue increased slightly from £4,413 to £4,689.

Year to Sep. 30	Total Revenue £	Tax- ation £	Net Profit £	Divi- dend £	To Reserve £	Carry Forward £
1954	114,309	4,089	70,752	53,778	15,000	31,076
1953	62,692	1,592	25,268	39,722	Nil	29,102

Dividends amounting to 10 per cent were paid on the issued ordinary capital of £977,778. This compared with 7½ per cent previously.

Although not yet at the dividend paying stage, the Rhodesian Brick and Potteries Company, in which the corporation has a large interest showed a profit from brick-making of £81,377 as compared with £56,345 in the preceding period. During the year confidence in the future of this concern was tangibly

expressed by the corporation exercising its option to take up an additional 102,000 shares. This, together with a cash payment, extinguished the corporation's loan to the company.

Prospects for the current year appear very promising, and apart from a dividend which may be anticipated from Rhodesian Brick and Potteries Company, an interim distribution of 7½ per cent has already been made by Falcon Mines. Moreover, the position at the Fred and Redwing Mine is encouraging while the outlook for farming operations can be regarded with considerable optimism. It is also possible that the current year will again provide favourable opportunities for share dealing.

Mr. L. C. Walker is chairman. Meeting, London, May 11.

Camp Bird Earns More and Pays More

Profits earned by Camp Bird during the year ended December 31, 1954, showed a marked advance on those of the previous year. Accordingly, a dividend of 10 per cent has been recommended on the issued ordinary capital of £1,086,943 in shares of 10s. This compared with 7½ per cent in respect of the preceding year.

Year to Dec. 31	Total Profits £	Tax- ation £	Net* Profit £	Divi- dends £	To Reserve £	Carry Forward £
1954	181,464	69,653	112,811	59,782	50,000	49,232
1953	127,813	40,028	87,785	44,836	50,000	42,703

* Excluding Cr. £4,500 (1953 - Cr. £13,835) in respect of taxation provisions no longer required.

Following the recent circulars to shareholders from the directors of the company and a group under the leadership of Mr. J. Dalgleish, it has been announced by the company that a further important circular letter will be issued with the annual report and accounts on or about March 31. Pending receipt of this letter shareholders are advised not to dispose of their holdings.

At the same time, a further communication has been circularized by Mr. Dalgleish. This exhorts shareholders not to accept any offer which might be forthcoming from Camp Bird and describes the company's assets as probably being at their lowest ebb. He hopes to force the election of a new board of directors at the meeting on April 25 (see *M.J.*, February 11, 1955). Mr. F. C. Heley is chairman.

Chartered's Bright Outlook

One of the most interesting comments made by Sir Dougal O. Malcolm at the meeting of the British South Africa Company was that the estimated copper royalty for the first five months of the current financial year at £3,536,402 slightly exceeded that of the corresponding previous period. This increase has been achieved despite the Copperbelt labour strike.

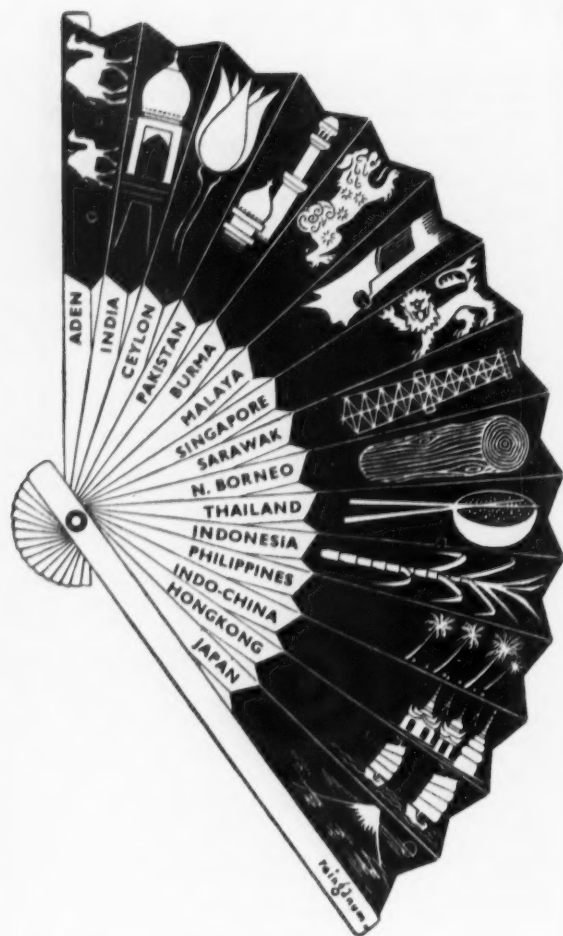
Power Curtailment Will Cut Electrolytic Zinc's Output

It has been announced by the Electrolytic Zinc Company of Australasia that due to deterioration of water storages arising from the long period of dry weather in Tasmania, the company's power supply from the Hydro-Electric Commission was cut by about 20 per cent as from March 23. This will entail a reduction in output equivalent to a rate of some 20,000 tons of zinc a year.

Demand for Hilger and Watts' Products Growing Steadily

Referring to the growing demand for his company's products, Mr. G. A. Whipple, the chairman of Hilger and Watts, scientific instrument makers, stated at the meeting of the company held earlier this week that orders on hand were substantially greater than those at the same time last year. He also touched on the latest developments which are being pursued. Of particular interest amongst these, was the Thomson Plotting Machine which is establishing the company firmly in the field of photogrammetry.

During the year which ended on September 30, 1954, the company's trading surplus rose from £153,498 to £181,714. Net profits were increased from £28,634 to £37,730 and the balance carried forward from £76,042 to £98,242. Dividends of 9 per cent were paid on the company's issued ordinary capital of £225,000 in ordinary shares of £1. This compared with 7½ per cent in respect of the previous year.



Spanning the East

Branches of The Chartered Bank of India, Australia and China under British management directed from London are established in most centres of commercial importance throughout Southern and South Eastern Asia and the Far East. At all these branches a complete banking service is available and, in particular, facilities are provided for the financing of international trade in co-operation with the Bank's offices in London, Manchester and Liverpool, its agencies in New York and Hamburg and a world-wide range of banking correspondents. In London and Singapore the Bank is prepared to act as executor or trustee.

THE CHARTERED BANK OF INDIA, AUSTRALIA AND CHINA

(Incorporated by Royal Charter, 1853)

Head Office: 38 Bishopsgate, London, E.C.2

THE ANGLO-FRENCH EXPLORATION COMPANY, LIMITED

INCREASED PROFITS AND DIVIDEND

The Sixty-fifth Annual General Meeting of The Anglo-French Exploration Company, Limited, was held on March 30 in London.

The Chairman, Mr. F. R. Cottell, A.C.A., who presided, said:

General reserve is increased to £100,000 by the transfer of £25,000 from the available profit, thus reducing the unappropriated profit carried forward by that amount.

INVESTMENTS

Our investments stand in the books at £1,020,746 and are valued at £1,466,538, an excess of £445,000. Although such excess is a fluctuating figure, being dependent partly on the general level of share prices, it is gratifying to note that the investment position has been maintained satisfactorily whilst at the same time improved profits for the year have been achieved.

The classification of our investments based on the valuation at December 31, 1954, is:—

Gold Mining (including holding companies which have substantial interests in gold mining companies)	54.9%
Oil	17.6%
Copper, lead, zinc	12.7%
Tin	6.7%
Coal	6.3%
Miscellaneous	1.8%

The main investment continues to be in gold mining and I may say that over one half of the valuation of our gold shareholdings relates to mines on the Western Rand and in the Orange Free State which are still in the development stage or have not yet worked up to full scale operations.

Current assets total £73,448, the net liquid position showing a deficit of approximately £60,000 after providing for the dividend. From this it will be appreciated that our funds are fully invested.

PROFIT FOR YEAR

Our dividend income has been maintained, that profit on sales of land is down by £4,000, while profit realized by sales of shares and sundry credits at £21,674 shows an increase of over £9,000. I pointed out last year that the profit on land sales represented final amounts received from the disposal of our holdings in Southern Rhodesia and that it was intended to retain for the present the remaining area of approximately 3,500 acres near Gwelo. The small profit appearing in this year's accounts arises from the disposal of a small building lot at Mimosa, the sale price of which has been paid up in full. Total revenue is £104,688 and, after deduction of expenses £17,751 and taxation £40,245 and after applying £7,583 in reduction of book value of investments, the profit for the year after tax is £39,109 against £33,320 in 1953. A dividend for the year of 8½%, that is 1s. 9d. per £1 unit of stock, is recommended. The sum of £25,000 is transferred to general reserve leaving £5,477 to be carried forward.

INFLATION

There has been no change in taxation in the United Kingdom since our last meeting and, although it is clear that the Chancellor of the Exchequer will have a substantial surplus in the current fiscal year, the possibility of much needed tax reliefs being granted is considerably lessened by the changing terms of trade. While the action of the Chancellor in increasing the bank rate to 4½% in order to restrict credit should have some disinflationary effect, I suggest that it is unlikely to halt in any worthwhile degree the continuing inflation to which we are subject and which since the war there has been no real effort to restrain either by control of Government and local authority expenditure or by an effective lead in the stabilizing of wages and prices. Failure to face up to these prime requirements must mean that the country will continue on an inflationary course to the detriment of all but particularly to those members of the community who answer the Government's call to save and invest.

While we have not as yet received sufficient information to make a proper study of the undistributed profits tax which is to be imposed in South Africa it does not appear that the tax should affect unduly the companies in which we have share interests.

The report and accounts were adopted.

THE BRITISH SOUTH AFRICA COMPANY

SUBSTANTIAL FINANCIAL COMMITMENTS ENVISAGED

SIR DOUGAL O. MALCOLM'S SPEECH

The 57th annual meeting of The British South Africa Company was held on March 24 in London.

Sir Dougal O. Malcolm, K.C.M.G. (the President), presided, and in the course of his speech said:—

The mineral revenue for the year ended September 30, 1954, at just under £7,400,000 was very nearly £400,000 less than for the year before, but as against that the charge on us for Excess Profits Levy was a little over £1,000,000 less, and the total charge for taxation on profits was a little over £800,000 less.

Over all, our total revenue for the year under review was £9,012,861 and our total outgoings including taxation £5,716,963, so that our net profit for the year under review was £3,295,898, as against £2,988,143 for the year before, an improvement of a very little over £300,000.

For the whole year, including the interim dividend of 13½ per cent. paid in last October, we propose to pay the same dividend as last year, namely 50 per cent. or 7½d. per unit of stock or share, thus increasing the sum of our unappropriated profits from £5,795,846 at September 30, 1953, to £7,284,890 at the date of the accounts.

BALANCE SHEET FEATURES

Our total capital and Reserves have risen from £15,577,357 to £17,066,401. As against that the book figure of our Fixed Assets has risen only by a little over £150,000 to £2,815,535.

Our current assets at just under £10,000,000 exceed our current liabilities, including the proposed dividend, by a little over £1,300,000.

The total book figure for all our investments stands at £13,358,890 as against £11,977,196 for the year before, an increase of about £1,400,000. Quoted Investments at £9,172,086 had a market value at the date of the balance sheet of £19,809,052. A valuation made at the end of last week shows that the market value of Quoted Investments at present held, which have a book value of £9,776,900 amounted to £23,046,500.

The large book figure of Unquoted Investments—£4,186,804—is largely attributable to the fact that, it includes £1,700,000 for the book value of our half interest in New Rhodesia Investments Limited, which is itself unquoted and which, at the date of the Balance Sheet, held Quoted Investments of a book value of £3,629,070 and a market value at that date of £7,322,048. The latest figures which I now have show that investments of a book value of £3,997,100 and a market value at the end of last month of £8,519,300, your half interest in which amounts to £4,259,700. That, added to the figure of £23,046,500, which I gave you a few minutes ago makes £27,306,200 in all.

THE CURRENT YEAR

As regards the year now current, the Northern Rhodesia Copper output for the period from October 1 last to the end of February has been 122,523 tons. The output for the months of January and February was only 8,189 and 17,107 tons respectively as against a monthly average for the year under review of 31,469 tons and is abnormally low, owing to the African miners' strike. As against our loss of royalty from this source the price of copper on which our royalties are based averaged £246 per ton for the five months since October 1 last, as against an average of £205 per ton for the same period of last year.

An estimate of Copper Royalty for the first five months of the current year at £3,536,402 slightly exceeds the final figure for the same period of last year; so that if the price of Copper, now very high, is fairly constant and there are no more strikes we may hope that we shall do considerably better for the year now current than we did for the year under review.

BOARD'S FUTURE POLICY

The position of our Company I think you will agree is strong. But I hope we shall adhere to our policy of modest dividend distribution with the object of building up during the thirty-one years of our Northern Rhodesia Mineral Rights which are still left to us, a great body of investments to take the place of our Mineral Rights which we shall have to make over to the Northern Rhodesian Government thirty-one years hence.

It is indeed our duty and obviously to our interest to do everything we can while our Mineral Rights remain as they are now to foster and expedite the exploitation of those rights in every possible way. This must involve our having to look forward to substantial financial commitments as against our certainly substantial revenues. The development of the very promising Bancroft Mine is a case in point.

In order to help in the duplication of its promised output as against what was originally contemplated we have undertaken

to advance to that concern during the period from now till the end of 1960 the sum of £3,000,000, another £2,000,000 being similarly advanced by the Anglo-American Corporation against valuable options on Bancroft shares at 37½d. a share, the present market price of the shares being about 42½d., with very encouraging prospects in view.

HYDRO-ELECTRIC POWER SCHEME

There is also the very important matter of hydro-electric power for Rhodesia; and there has been for a considerable time past a rivalry between the Kariba Gorge Scheme on the Zambesi River and the Kafue River Scheme. This, as no doubt you know, has quite recently been decided by the Federal Government of Rhodesia and Nyasaland in favour of the Kariba Gorge Scheme based on a contribution from the United States of £46,000,000 towards the estimated total cost of £54,000,000 of the first stage of this scheme, which involves the raising in Rhodesia of the balance of £8,000,000. The whole Rhodesian community is greatly interested in the successful prosecution of a power scheme like that, and none more heavily than the copper mining companies, who have hitherto been so much handicapped by shortage of power, and ourselves, with our immense interest in their production and their success. We must, therefore, look forward to having to play our part fairly, along with others, in the provision of the £8,000,000.

I have mentioned two very large schemes involving large prospective commitments, and there will no doubt be others. I hope there will; for commitments are the corollary of opportunity and it therefore behoves us to keep a lot of powder dry for them.

The report and accounts were unanimously adopted.

At a subsequent extra-ordinary general meeting the capital of the company was increased to £13,500,000 by the creation of 9,000,000 new shares of 15s. each and the capitalisation of £6,570,376 10s. 0d. of reserves, to be allotted as fully paid up in the proportion of one new share of 15s. each for every stock unit or share to bearer of 15s. each held, was approved, the shares on allotment to be automatically converted into registered stock.

Mining Matters

Centenary Congress: The Centenary Congress of the Société de l'Industrie Minérale will be held in Saint-Etienne on June 16-18, 1955, and in Paris from June 18-July 3, 1955. The programme of the congress will include an international exhibition of the mining industry in Paris, while working sessions will be grouped according to seven special subjects; namely Thick Seams at Saint-Etienne, and at Paris, Iron and Steel, Mechanized Getting and Loading in Longwall Faces, Mechanized Getting and Loading in Room and Pillar Workings, Mineral Discovery, Underground Electrification, and The Mine of the Future.

Research in Diamond Cutting and Polishing: After difficult preliminary work the Amsterdam Jewellers Association (AJV), last summer established a foundation named the Netherlands Diamant-Speurwerk-Centrum (Netherlands Diamond Research Centre). Substantial sums for the establishment have been received from the American Productivity Organization. Prof. Inge D. Dresden is chairman of the Council, and of the Nijverheidsorganisatie T.N.O.

JANUARY COAL OUTPUT

Company	January 1955 (in tons)	Months Since Year End	Cumulative Totals (in tons)	
			This year to date	Last year to date
Amal. Coll. of S.A.	542,468	1	542,468	578,123
Apex	87,081	1	87,081	81,496
Blesbok	44,068	1	44,068	44,672
Coronation	93,125	1	93,125	101,218
Dundee	29,580	1	29,580	39,022
Natal Navigation	97,503	7	710,177	800,258
New Clydesdale	76,372	7	523,688	508,878
New Largo	72,162	1	72,162	64,716
S.A. Coal Est.	132,377	7	950,709	968,239
Springbok	70,894	1	70,894	69,959
Transvaal & Delagoa	120,037	1	619,221	629,915
Van Dyks Drift	60,194	1	60,194	61,296
Vierfontein	99,588	1	99,588	60,885
Vryheid Cor.	45,532	1	45,532	42,086
Vryheid Cor.*	37,900	1	37,900	35,011
Wankie Coll.	295,563	5	1,399,652	1,040,186
Wankie Coll.*	18,003	5	81,551	60,907
Witbank	153,339	1	153,339	160,372

* Coke

WESTERN SELECTION AND DEVELOPMENT

CANADIAN INTERESTS

The Twenty-fifth Annual General Meeting of Western Selection and Development Company Limited was held on March 24 in London, **Major-General W. W. Richards, C.B., C.B.E., M.C.**, chairman, presiding. The following are extracts from his circulated statement:—

We recommend a final distribution of 12½ per cent, making 20 per cent, for the year as against 15 per cent, last year. The profit amounted to £128,903.

Addressing the meeting, the Chairman said: Since our report was circulated, the Amalgamated Banket Areas Ltd. have announced the payment of a 7½ per cent, dividend. The recent returns from that mine are highly encouraging.

Our offer of shares to members was a complete success and was over-subscribed, applications totalled 1,156,857 shares.

Regarding our Canadian project. The position is that we have received Bank of England and Treasury sanction for the formation of a new company in Canada to acquire under option nickel copper claims in Northern Manitoba and uranium claims at Higginson Lake, Northern Saskatchewan.

The nickel copper claims, known as the Tow Lake Claims, are situated 35 miles east of the remarkable nickel copper deposit at Lynn Lake of the Sherritt Gordon Mines Ltd., which has, within the last year, come into full production. With the express purpose of serving this mine, the Canadian National Railway Company completed 147 miles of line at an estimated cost of \$5,000,000. In addition, numerous potential sources of water power exist in the area of the Tow Lake Claims.

The uranium claims in Northern Saskatchewan comprise 31 claims on Higginson Lake and 12 claims on the nearby Charlebois Lake, in the northern extremity of Saskatchewan in the Lake Athabasca mining area.

As soon as an issue of stock has been made in the new company, development work will begin first of all on the Tow Lake Nickel Claims in Northern Manitoba, to test the deposits and define ore reserves.

Your board consider this Canadian venture has great potential value.

The report and accounts were adopted.

HILGER AND WATTS LTD.

(Scientific Instrument Makers)

The Seventh Annual General Meeting of Hilger and Watts Limited was held on March 24 in London.

Mr. G. A. Whipple, M.A., M.I.E.E., chairman and managing director, in the course of his speech, said:—

I am pleased to report that the trading surplus of the company has risen from £153,498 to £181,714, the net profit from £28,634 to £37,730, and the balance carried forward to the consolidated balance-sheet from £76,042 to £98,242.

The dividend on the Ordinary shares has remained constant for the past five years, and consequently the reserves have steadily increased. The board of directors felt it wise to maintain a conservative policy as to distribution until the new factory had been established. Now that it is in full production, and although extensions are planned, the directors recommend an increase in the dividend on the Ordinary shares of 1½ per cent., making 9 per cent, for the year.

The demand for the company's products is growing steadily, and orders on hand are substantially greater than at this time last year, but competition in the markets for "traditional instruments" is becoming increasingly keen. From year to year our overseas markets change, and to-day Australia and New Zealand are our largest overseas market, a market stimulated by visits firstly from Mr. Stanley, our sales director, and later by Dr. Menzies, our director of research.

At this time last year I spoke of two major technical achievements and am glad to tell you that each has borne fruit. Developments in polychromators have accelerated; the first large instrument is in use continuously and others are now being built. A smaller version is in regular production, whilst a third type is being specially designed for the steel industry. The Thompson Plotting Machine is establishing us firmly in the field of photogrammetry, and other instruments in this sphere are under development.

You may have seen in the Press reference to the automatic factory, and the Institution of Production Engineers is examining its implications. Our research staff are closely watching developments in this direction and have already evolved a range of scales and projection reading devices for machine tools of many types.

The report and accounts were adopted.

February Mine Returns

AUSTRALIAN GOLD

Company	February 1955		Months Since Year End	Current Financial Year Total to date		Last Financial Year Total to date	
	Tons (000)	Yield (oz.)		Tons (000)	Yield (oz.)	Tons (000)	Yield (oz.)
Boulder Perseverance	9.6	1,946	12	121.3	27,414	122.2	29,854
Central Norseman	12.3	5,438	12	145.5	75,120	143.6	70,804
Central Victoria*	97.6	4,402	12	1,668.4	5,225	2,567.8	9,734
G.M.'s of Kalgoorlie	15.5	4,475	12	185.2	51,459	180.9	52,379
Morning Star	1.3	508	12	15.4	9,875	18.1	17,080
New Coolgardie	5.0	3,328	12	61.7	31,823	63.6	29,569
North Kalbarri	24.5	5,794	2	43.7	10,073	39.3	8,935
South Kalbarri	7.3	1,914	12	93.7	20,362	105.9	21,339

* Cu. yd. (000) dredged

SOUTHERN RHODESIAN GOLD

Company	February, 1955			Months since year end	Current Financial Year Total to date			Last Financial Year Total to date		
	Tons (000)	Yield (oz.)	Profit (£000)		Tons (000)	Yield (oz.)	Profit (£000)	Tons (000)	Yield (oz.)	Profit (£000)
Arcturus	3.0	730	1.3†	7	24.4	7,204	23.7	24.8	—	24.1
Cam & Motor	23.3	7,437	41.2	7	192.3	60,340	330.5	194.2	60,708	360.8
Falcon Mines	16.2	3,028	10.1*	4	85.1	15,567	258.2	83.2	13,383	31.9
Globe & Phoenix	6.0	3,536	23.4	2	12.2	7,084	47.5	12.2	7,069	46.8
Motapa	14.8	2,096	0.2	2	30.2	4,205	1.0	36.5	4,875	7.2
Muriel Mine	3.4	974	10.1	7	25.2	7,877	80.5	17.0	—	58.0
Tebekwe	7.1	1,001	1.3	7	59.2	7,963	10.4	65.3	—	20.9

† Profit reduced owing to mining and development policy. Should return to normal in March

L Loss

* Including £1,491 from accumulated conc. retreated in roasting unit.

‡ A further £705 in respect of gold produced in December 1954 not included

WEST AFRICAN GOLD

Company	February, 1955			Months since year end	Current Financial Year Total to date			Last Financial Year Total to date		
	Tons (000)	Yield (oz.)	Profit (£000)		Tons (000)	Yield (oz.)	Profit (£000)	Tons (000)	Yield (oz.)	Profit (£000)
Amal. Banket	86.8	13,211	33.4	4	420.7	65,523	167.6	331.9	53,512	70.1
Ariston Gold	38.3	10,639	43.4	4	183.5	53,349	236.0	156.4	50,467	218.7
Ashanti	26.0	16,288	69.7	4	129.0	81,387	349.6	120.0	76,923	311.5
Bibiani (1927)	30.0	6,250	15.3	4	149.0	31,850	72.7	123.1	31,405	33.1
Bremang*	528.5	2,136	1.8	2	118.3	4,600	4.5	622.7	2,475	1.1
G.C.M. Reef	9.0	3,240	9.3	7	78.0	31,002	108.8	63.2	29,763	90.6
Konongo	3.4	3,189	16.0	4	17.2	15,854	77.6	13.3	13,237	65.2
Lyndhurst Deep	1.1	1,120	5.6	4	4.9	5,750	31.7	4.9	5,946	28.3
Marlu Gold	35.3	1,737	1.7	4	173.7	11,823	120.9	199.3	20,176	75.3
Taqaah & Abosso	28.1	5,857	2.3	10	309.0	64,813	33.7	727.9	36,591	101.9

* Cu. yd. dredged

L denotes loss

† Figures include premium revenue

‡ Dredges 2 and 4 operating lower values and £3,000 non-recurring maintenance charge

INDIAN GOLD

Company	February, 1955			Months since year end	Current Financial Year Total to date			Last Financial Year Total to date		
	Tons (000)	Yield (oz.)	Profit (£000)		Tons (000)	Yield (oz.)	Profit (£000)	Tons (000)	Yield (oz.)	Profit (£000)
Champion Reef	15.9	5,483	—	2	28.7	10,712	—	29.4	11,419	—
Mysore	14.7	4,899	—	2	31.5	9,487	—	32.1	12,952	—
Nundydroog*	16.0	4,228	—	2	35.4	8,763	—	40.5	11,355	—
Ooregam	—	85†	—	2	—	222	—	—	232†	—

* Includes tailings

† Yield from clean-up only

MISCELLANEOUS GOLD

Company	February 1955		Months Since Year End	Current Financial Year Total to date		Last Financial Year Total to date	
	Tons (000)	Yield (oz.)		Tons (000)	Yield (oz.)	Tons (000)	Yield (oz.)
Br. Gu. Consol.*	128.7	1,337	2	281.9	3,308	357.6	3,494
Clutha River*	242.0	589	12	2,654.0	5,327	2,675.0	5,347
Frontino	10.9	6,023	2	23.2	12,062	18.7	11,768
Kentian (Gibraltar)	23.2	3,480	8	179.3	27,466	172.0	25,946
New Gu. Gldfids.	3.3	1,048†	5	17.5	7,130	15.5	6,315

* Cu. yd. (000) dredged

† Includes 106 oz. from tributaries

GOVERNMENT OF THE UNION OF SOUTH AFRICA DEPARTMENT OF MINES

1. Applications are invited from suitable qualified persons, on Contract for three years, renewable for a further period, to the Public Service of the Union of South Africa, for the following posts:

2. *Designation: Junior Geologist.* Salary scale £450 × 30—£540 × 48—£780 (temporary minimum £480). Successful applicants holding the M.Sc. degree will commence at the £510 per annum notch. In addition a Cost of Living Allowance of £234 per annum will be paid to married persons. Previous experience will be considered in fixing the further commencing salary.

3. *Minimum qualifications required* are the B.Sc. degree with Geology and Physics and Chemistry as main subjects, but preference will be given to persons who have had post-graduate experience or who have higher qualifications.

4. Conditions of Employment will in the first place be governed by the terms of the Contract and the Public Service Regulations. Successful applicants will be required to acquire within a reasonable time a knowledge of the Afrikaans language.

5. *Nature of duties.* The duties are mostly field work, reports and mapping and successful applicants will be required to act independently.

6. *Transport expenses* from place of residence to place of employment (3rd class rail in United Kingdom, tourist, cabin or cheapest first class boat to South Africa, whichever is available, and 1st class rail in South Africa) including excess baggage to a maximum of 150 lb. per adult and 75 lb. per child, and similar return passage on satisfactory completion of Contract, will be paid by the Union Government.

7. *Applications in writing* giving full details of qualifications and previous experience should be addressed to Room 102, South Africa House, Trafalgar Square, London, not later than April 30, 1955.

GEOLOGISTS — DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

The Civil Service Commissioners invite applications for four pensionable appointments at the Geological Survey and Museum. Age at least 21, and under 30 (31 for permanent members of the Experimental Officer Class) on April 1, 1955, with deduction from age for regular service in H.M. Forces. Candidates must have obtained (or obtain in summer 1955) a university degree with first or second class honours in Geology or an equivalent qualification or possess high professional attainments.

One of the posts requires special qualifications in palaeontology.

Inclusive annual remuneration for a 45½ hour week (London) (men) £532-£955; (women) £532-£842 (subject to improvement under the recently announced Equal Pay scheme); somewhat lower in provinces. Provision for starting salary above minimum. Prospects of promotion. Further particulars and application forms from Civil Service Commission, Scientific Branch, 30 Old Burlington Street, London, W.1, quoting No. S168/55. Application forms to be returned by April 21, 1955.

FULLY QUALIFIED MINE ENGINEER required for South America at a salary equivalent £4,000 per annum, to take technical charge of Gold Mines producing 30,000 tons per month capable of expansion; free furnished house and passages for wife and children. Three Year Agreement. Other advantages. Good climate. Reply Box No. 148/3, Foster, Turner and Everetts Ltd., 11 Old Jewry, London, E.C.2.

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WIGAN AND DISTRICT MINING AND TECHNICAL COLLEGE

Applications are invited for the post of Head of the Mining and Geology Department, shortly becoming vacant through the retirement of Mr. Robert M. Chalmers, M.C., B.Sc., M.I.Min.E. Duties will commence on September 1, 1955, or such other date as may be arranged.

Candidates should possess high academic qualifications, preferably an Honours Degree in Mining; practical mining experience; and teaching experience, preferably in a Technical College or University.

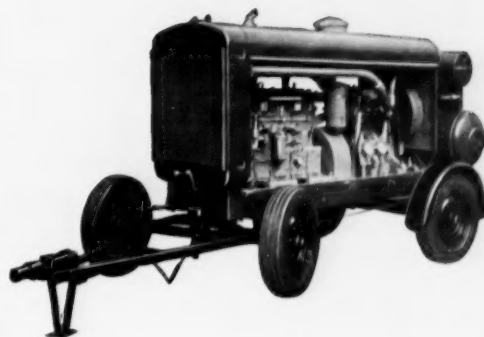
Salary in accordance with Burnham scale for Heads of Departments Grade III (£1,215 - £25 - £1,365). A salary above the minimum of the scale may be paid to a suitably qualified candidate.

Further particulars and application form will be sent by the undersigned on receipt of a stamped, addressed foolscap envelope. Applications not on the form provided will be disregarded. Last date for receipt of applications: Monday, April 25, 1955.

E. C. SMITH,
Principal.

MINE AGENT required by Copper Mining Company in India. Applicant should hold a recognized mining degree or equivalent, and be aged about 35. Salary starts at £1,000 p.a. rising to £1,050 in the third year with cost-of-living and servant allowances of £315 p.a. In addition, an annual bonus is paid, and a Provident Fund is in operation. Three years' contract with leave on full pay after 2½ years in India. Free furnished accommodation with fuel and light. Apply, giving full particulars, to Box 687, Walter Skinner Ltd., 20 Copthall Avenue, London, E.C.2.

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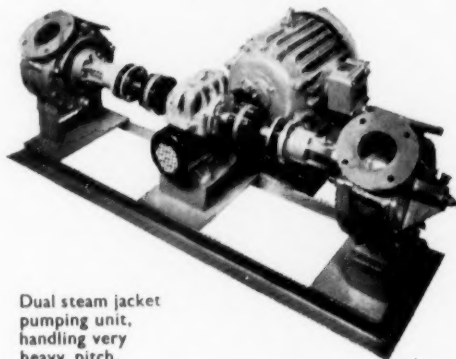
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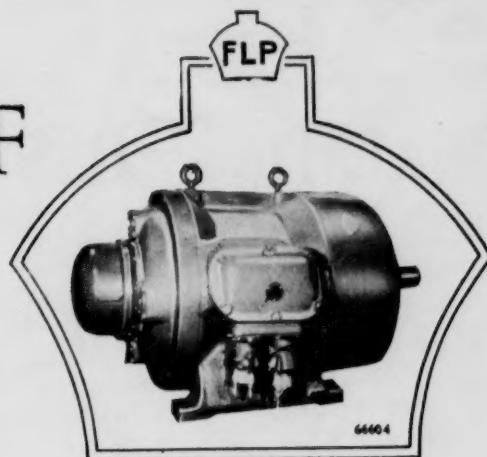
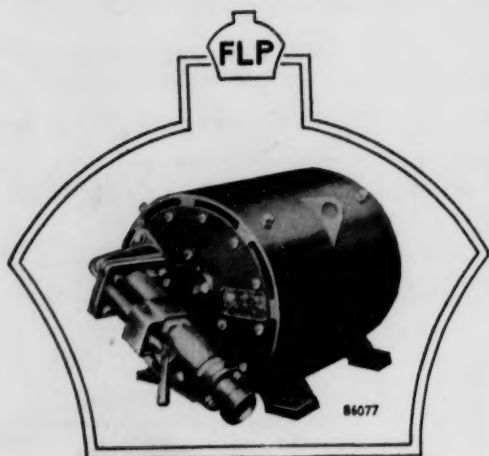
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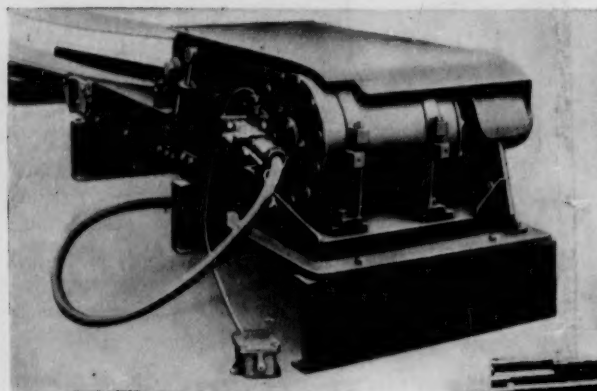
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Top Left: *Totally-enclosed fan-cooled flameproof squirrel-cage motor, type KF.*
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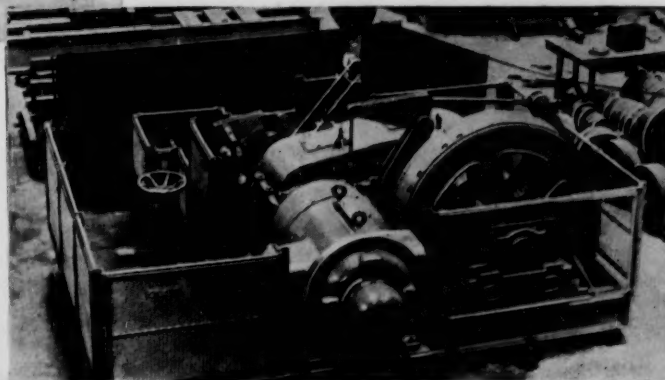
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Above: *Type KF flameproof motor driving a "Huwood" conveyor.*

Right: *125 hp, 580 rpm totally-enclosed, fan-cooled, flameproof Metrovick slipring induction motor driving Beckett and Anderson "Man-Riding" haulage for a colliery. Electro-hydraulic thruster operating main brake is seen on left of motor.*



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